

JVC

SERVICE MANUAL

DV CAMCORDER

GY-DV500U/GY-DV500E



The photo shows the GY-DV500 DV camcorder with an optional lens and viewfinder.

Mini DV
PROFESSIONAL DV

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Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

●Precautions during Servicing

- Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.
- Parts identified by the  symbol and shaded () parts are critical for safety.
Replace only with specified part numbers.
Note: Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.
- Fuse replacement caution notice.
Caution for continued protection against fire hazard.
Replace only with same type and rated fuse(s) as specified.
- Use specified internal wiring. Note especially:
 - Wires covered with PVC tubing
 - Double insulated wires
 - High voltage leads
- Use specified insulating materials for hazardous live parts.
Note especially:

1) Insulation Tape	3) Spacers	5) Barrier
2) PVC tubing	4) Insulation sheets for transistors	
- When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

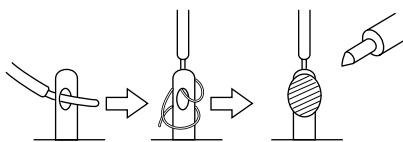


Fig.1

- Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.)
- Check that replaced wires do not contact sharp edged or pointed parts.
- When a power cord has been replaced, check that 10-15 kg of force in any direction will not loosen it.

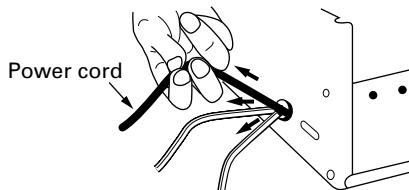


Fig.2

- Also check areas surrounding repaired locations.

- Products using cathode ray tubes (CRTs)
In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the specified parts. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission from the cathode ray tube.

- Crimp type wire connector

In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.

- Connector part number** : E03830-001
- Required tool** : Connector crimping tool of the proper type which will not damage insulated parts.
- Replacement procedure**
 - Remove the old connector by cutting the wires at a point close to the connector.
Important : Do not reuse a connector (discard it).

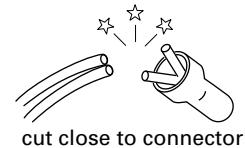


Fig.3

- Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.

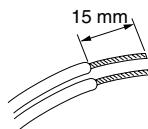


Fig.4

- Align the lengths of the wires to be connected. Insert the wires fully into the connector.

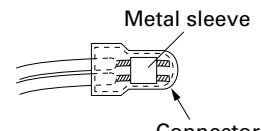


Fig.5

- As shown in Fig.6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

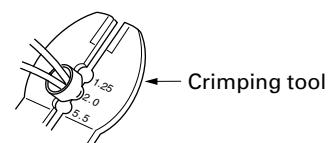


Fig.6

- Check the four points noted in Fig.7.

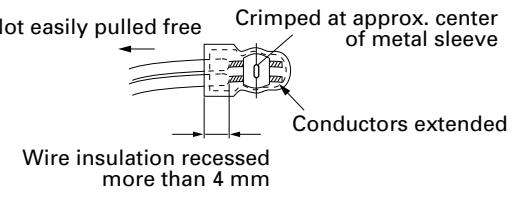


Fig.7

● Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions. Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

1. Insulation resistance test

Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

2. Dielectric strength test

Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

3. Clearance distance

When replacing primary circuit components, confirm specified clearance distance (d), (d') between soldered terminals, and between terminals and surrounding metallic parts. See table 1 below.

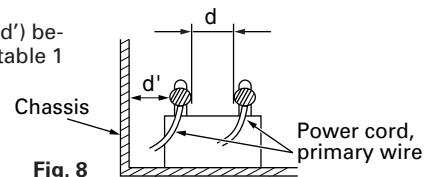


Fig. 8

4. Leakage current test

Confirm specified or lower leakage current between earth ground/power cord plug prongs and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).

Measuring Method : (Power ON)

Insert load Z between earth ground/power cord plug prongs and externally exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure 9 and following table 2.

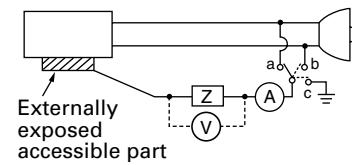


Fig. 9

5. Grounding (Class I model only)

Confirm specified or lower grounding impedance between earth pin in AC inlet and externally exposed accessible parts (Video in, Video out, Audio in, Audio out or Fixing screw etc.).

Measuring Method:

Connect milli ohm meter between earth pin in AC inlet and exposed accessible parts. See figure 10 and grounding specifications.

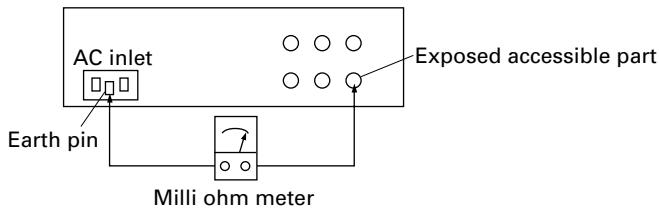


Fig. 10

Grounding Specifications

Region	Grounding Impedance (Z)
USA & Canada	$Z \leq 0.1 \text{ ohm}$
Europe & Australia	$Z \leq 0.5 \text{ ohm}$

AC Line Voltage	Region	Insulation Resistance (R)	Dielectric Strength	Clearance Distance (d), (d')
100 V	Japan	$R \geq 1 \text{ M}\Omega/500 \text{ V DC}$	AC 1 kV 1 minute	$d, d' \geq 3 \text{ mm}$
100 to 240 V			AC 1.5 kV 1 minute	$d, d' \geq 4 \text{ mm}$
110 to 130 V	USA & Canada	—	AC 900 V 1 minute	$d, d' \geq 3.2 \text{ mm}$
110 to 130 V 200 to 240 V	Europe & Australia	$R \geq 10 \text{ M}\Omega/500 \text{ V DC}$	AC 3 kV 1 minute (Class II) AC 1.5 kV 1 minute (Class I)	$d \geq 4 \text{ mm}$ $d' \geq 8 \text{ mm}$ (Power cord) $d' \geq 6 \text{ mm}$ (Primary wire)

Table 1 Specifications for each region

AC Line Voltage	Region	Load Z	Leakage Current (i)	a, b, c
100 V	Japan	$0 - 1 \text{ k}\Omega$	$i \leq 1 \text{ mA rms}$	Exposed accessible parts
110 to 130 V	USA & Canada	$0.15 \mu\text{F} - 1.5 \text{ k}\Omega$	$i \leq 0.5 \text{ mA rms}$	Exposed accessible parts
110 to 130 V 220 to 240 V	Europe & Australia	$0 - 2 \text{ k}\Omega$	$i \leq 0.7 \text{ mA peak}$ $i \leq 2 \text{ mA dc}$	Antenna earth terminals
		$0 - 50 \text{ k}\Omega$	$i \leq 0.7 \text{ mA peak}$ $i \leq 2 \text{ mA dc}$	Other terminals

Table 2 Leakage current specifications for each region

Note: These tables are unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

SECTION 1

SERVICE CAUTIONS AND DISASSEMBLY

1.1 RESETTING THE POWER CIRCUIT PROTECTION BREAKER

This unit employs a power circuit protection breaker in place of a fuse to disconnect from the main power and to thus protect the internal circuitry from damage caused by any current overload. The power can be re-connected by resetting the breaker.

To prevent any complications resulting from the failure, check the cause of the shutdown and repair it before resetting the circuit breaker.

- (1) Switch OFF the POWER of this unit as well as that of any equipment supplying power to it.
- (2) The circuit breaker **A** is located below the VCR at the rear. Press the BREAK button to re-connect the power line.

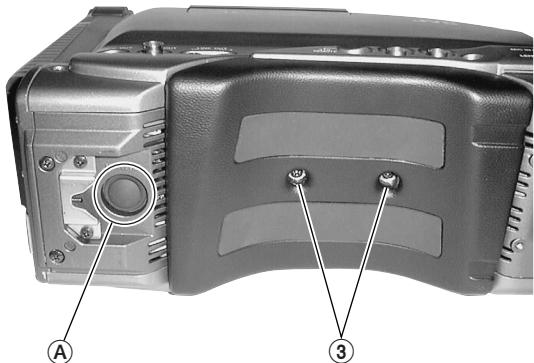


Fig. 1-1 Position of the Circuit Breaker

1.2 REMOVING THE EXTERIOR COVERS

1.2.1 Removing the Left Side Cover

- (1) Open the cassette door by pressing the EJECT switch.
- (2) Loosen the 4 screws **①** and remove the left side cover.

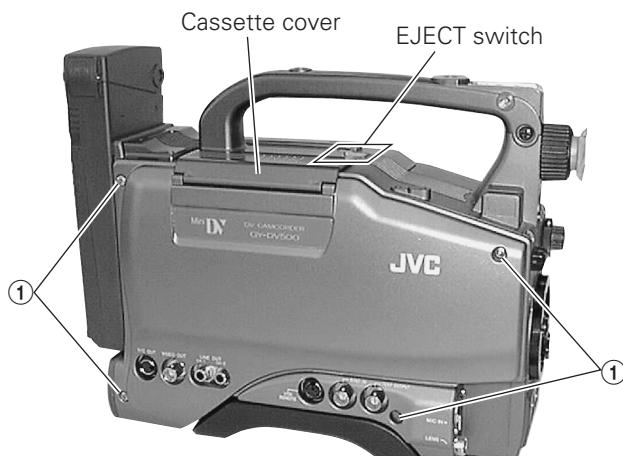


Fig. 1-2-1 Removing the Left Side Cover

1.2.2 Opening the Right Side Cover

- (1) Loosen the 4 screws **②**.



Fig. 1-2-2(1) Opening the Right Side Cover

- (2) Flip open the right side cover toward the front.



Fig. 1-2-2(2) View of the Opened Right Side Cover

1.2.3 Removing the Bottom Cover

- (1) Remove the left side cover (see section 1.2.1).
- (2) Remove the 2 screws **③** and remove the shoulder pads (see Fig. 1-1).
- (3) Remove the 4 screws **④** and remove the bottom cover.

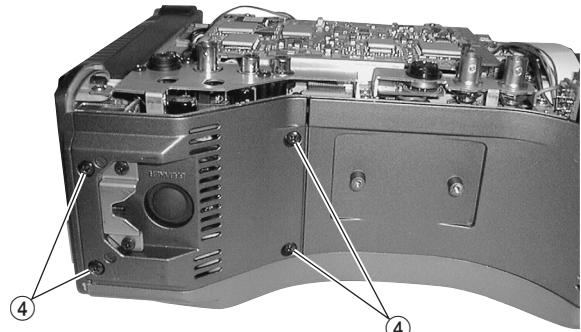
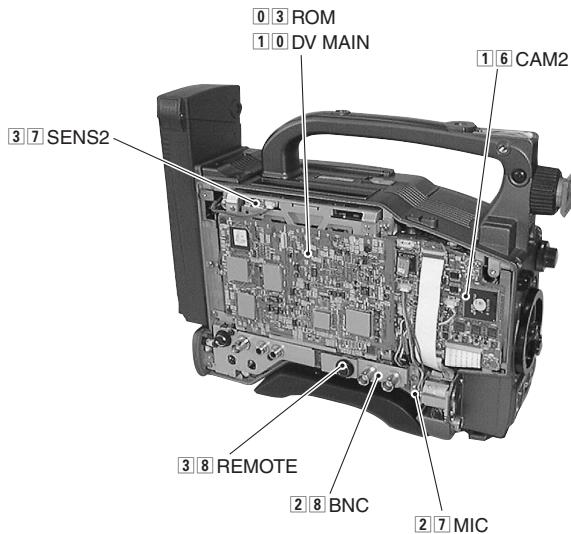


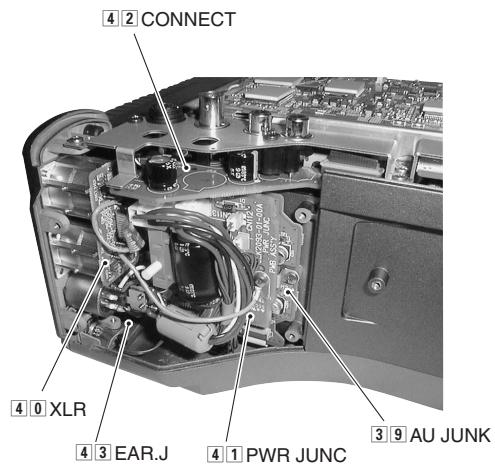
Fig. 1-2-3 Removing the Bottom Cover

1.3 LAYOUTS OF THE MAJOR BOARDS

On the side of the left-hand side cover

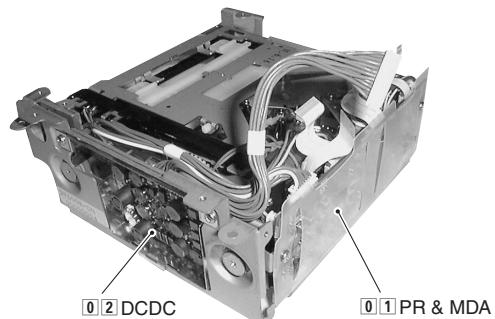
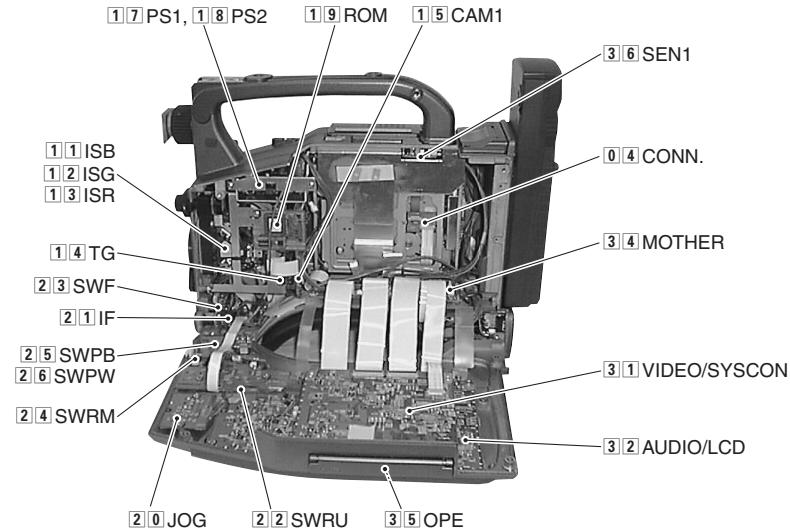


On the side of the bottom cover



VCR section

On the side of the right-hand side cover



1.4 REMOVING THE OPTICAL BLOCK ASSEMBLY AND THE OPTICAL FILTER ASSEMBLY

- (1) Remove the right side cover (see section 1.2.2).
- (2) Remove the screw ① retaining the ROM board.

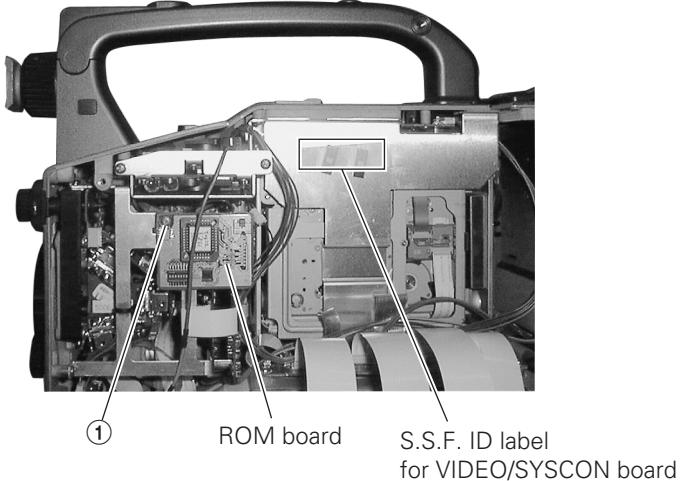


Fig. 1-4-1

- (3) Remove the 4 screws ②.

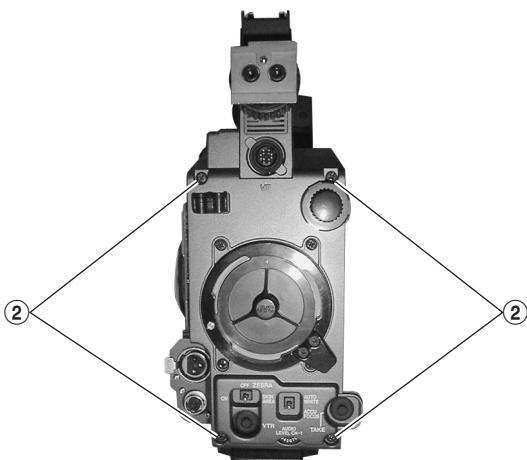


Fig. 1-4-2

- (4) Pull out the optical block assembly and the front panel together toward the front.

CAUTION

Be careful not to damage the boards or the FC cables.

- (5) Loosen the 2 screws ③ and remove the connector A.
- (6) Remove the optical filter assembly in the direction of the arrow.

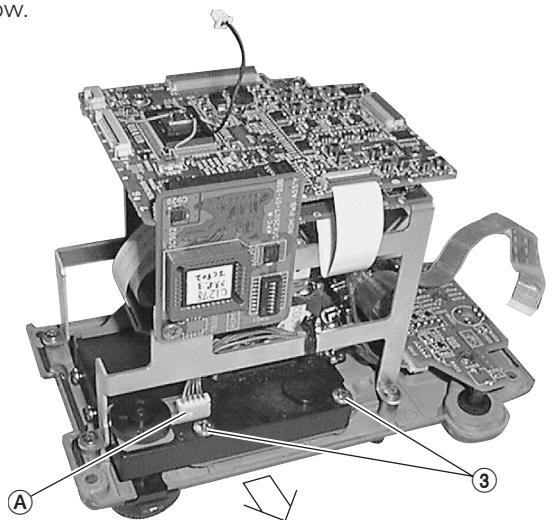


Fig. 1-4-3

- (7) Remove the 4 screws ④ and remove the TG board and CP board mounting brackets.

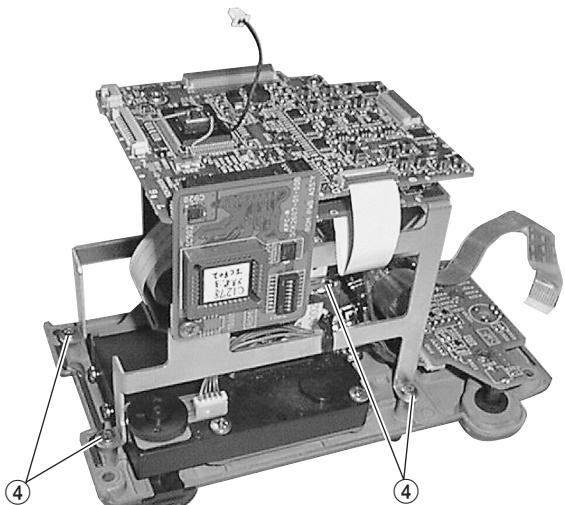


Fig. 1-4-4(1)

- (8) Flip open CN11, CN12 and CN13 and unplug the flexible cables.

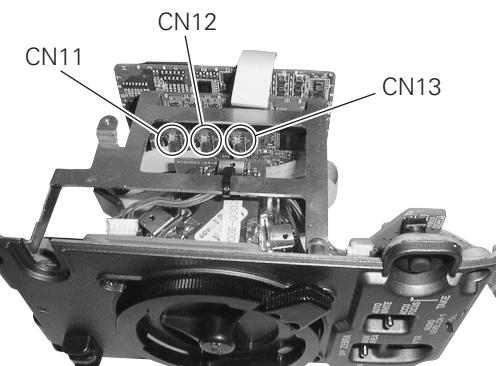


Fig. 1-4-4(2)

(9) Remove the 4 screws ⑤ and separate the optical block assembly from the front panel.



Fig. 1-4-5

NOTES

- The CCDs are bonded precisely to the prism. In case of trouble with a CCD, it is not possible to replace an individual CCD, but the entire optical block assembly should be replaced.
- The optical block assembly supplied as a service part (SCM1049-N0A (NTSC)/P0A (PAL)) is not equipped with the DR board. When replacing the optical block assembly, attach the surrounding PC boards to the new assembly before mounting it in the camera.

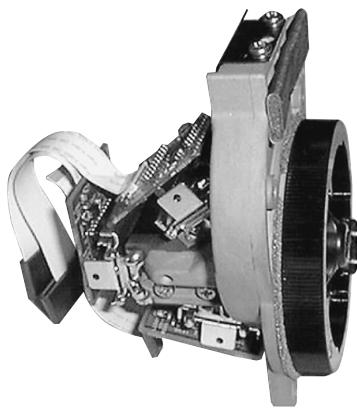


Fig. 1-4-6 Optical Block Assembly for Servicing

CAUTION

When mounting the optical block assembly in the camera, take care of the positioning of the wire assembly. A malfunction may occur if a wire is somehow caught up.

1.5 REMOVING MAJOR BOARDS FROM THE CAMERA

1.5.1 Removing the CP and TG Boards.

- (1) Remove the right side cover (see section 1.2.2).
- (2) Remove the 4 screws retaining the front panel (see section 1.4.3).
- (3) Pull out the optical block assembly and the front panel together toward the front.
- (4) Remove the screw retaining the ROM board. Now the ROM board can be removed.
- (5) Remove the 4 screws ①. Now the CP board can be removed.

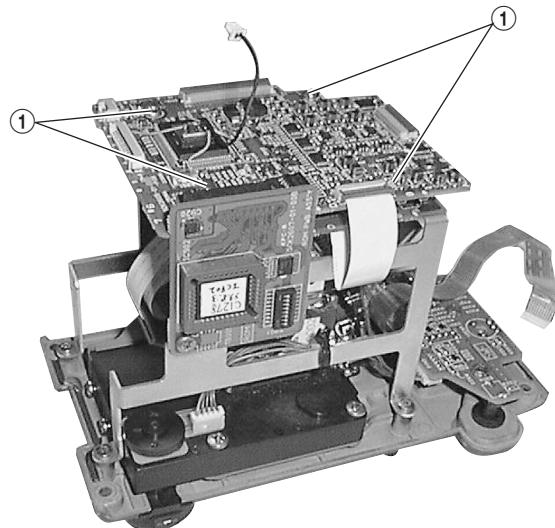


Fig. 1-5-1(1)

- (6) Remove the CP board, then remove the 4 stud screws ④. Now the TG board is disengaged from the stay.
- (7) Unplug the flexible cables connecting the IS boards and the TG board. Now the TG board can be removed.

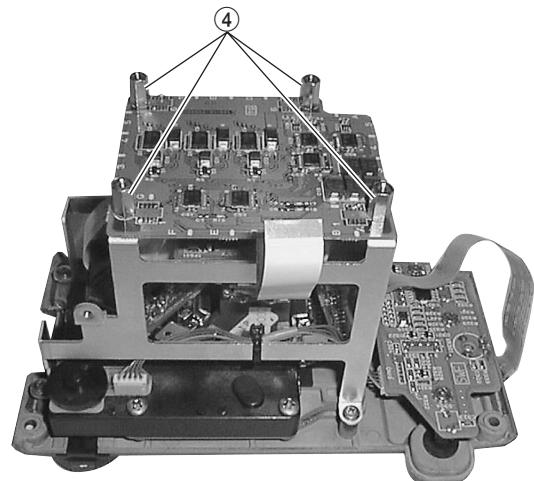


Fig. 1-5-1(2)

1.5.2 Removing the CAM1 Board

- (1) Remove the left side cover (section 1.2.1).
- (2) Remove the 6 screws ②.
- (3) The DV MAIN board on the VCR side and the CAM2 board are connected by a board-to-board connector. Open the two boards together in the direction of the arrow.

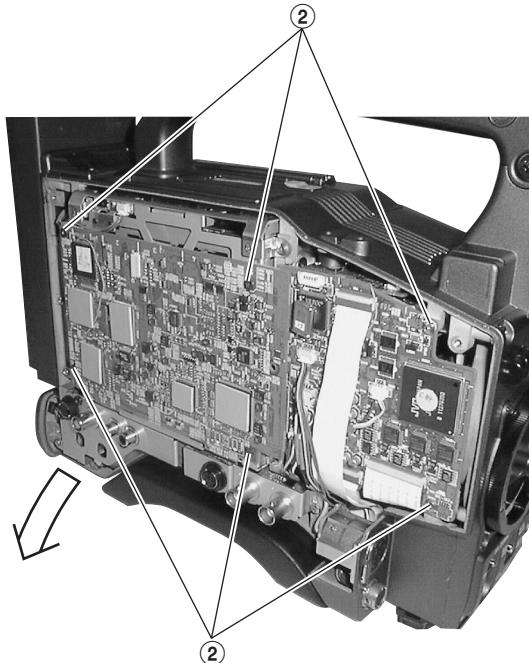


Fig. 1-5-2(1)

- (4) The opened boards can be secured by fitting them into the notches on the VCR side frame as shown in the figure.

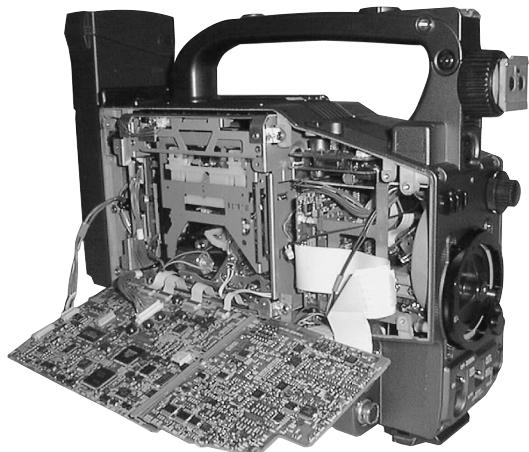


Fig. 1-5-2(2)

The operation of the VCR can be confirmed when the circuit boards are tilted.

When the circuit boards are tilted, take care that the electrical circuitry on each board is not short-circuited by the BNC connector located below the board.

1.5.3 Removing the SW Boards

- (1) Open the right side cover (see section 1.2.2).
- (2) The JOG, SWRU, SWRM, SWPW and SWRB boards are attached on the right side cover. Remove them as required.

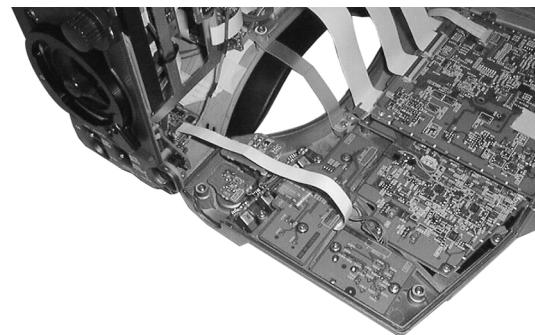


Fig. 1-5-3

1.5.4 Removing the PS 1 & 2 board.

- (1) Open the right side cover (see section 1.2.2).
- (2) Remove the 2 screws ③ retaining the PS 1 & 2 board.
- (3) Pull out the PS 1 & 2 board, along the guide rail in the direction of the arrow.

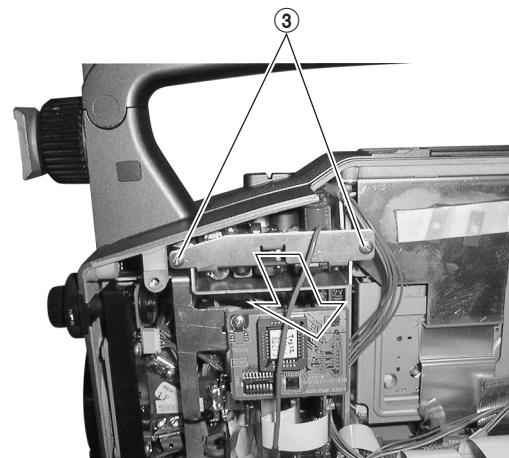


Fig. 1-5-4

1.6 REMOVING THE MAJOR BOARDS FROM THE VCR

1.6.1 Removing the VIDEO/SYSCON Board and Audio/LCD Board

- (1) Open the right side cover (see section 1.2.2).
The VIDEO/SYSCON board is clamped to the right side cover.
- (2) Remove the 2 screws ①. Now the VIDEO/SYSCON board can be removed.

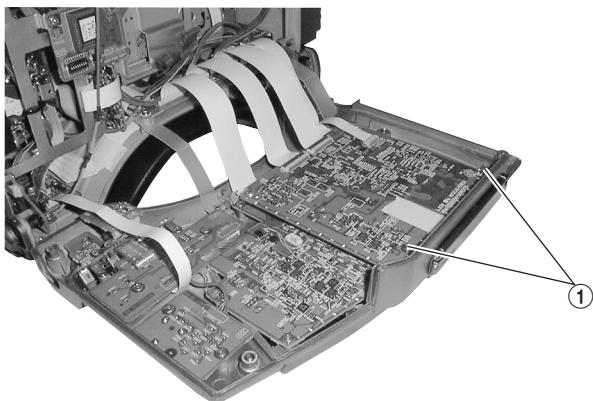


Fig. 1-6-1(1)

- (3) After removing the VIDEO/SYSCON board, remove the 6 screws ② and 2 studs ③. Now the AUDIO/LCD board can be removed.

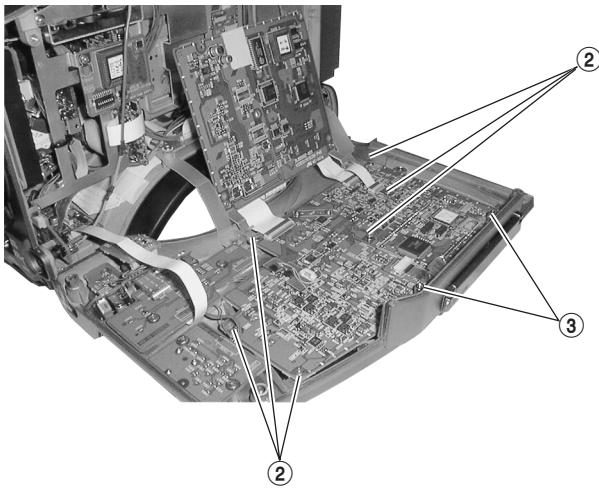


Fig. 1-6-1(2)

1.6.2 Removing the VCR Unit

- (1) Remove the left side cover (see section 1.2.1).
- (2) Remove the 4 screws ④.
- (3) Pull out the VCR unit gently in the direction of the arrow. As the VCR unit is connected to the CAM2 board with a board-to-board connector, disconnect it gently.

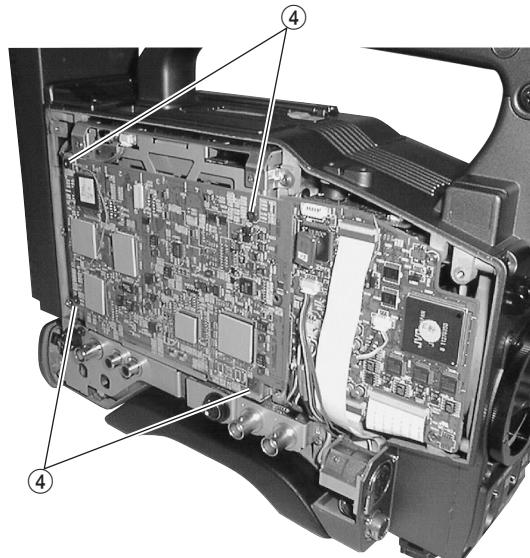


Fig. 1-6-2(1)

- (4) Remove the EJECT switch wire ⑤ and power supply wire ⑥.

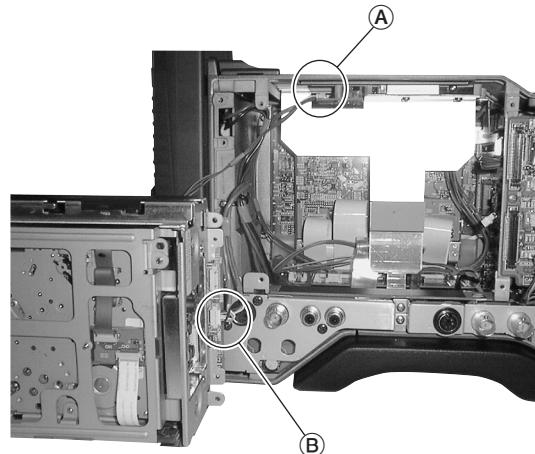


Fig. 1-6-2(2)

1.6.3 Removing the DV MAIN Board

- (1) Remove the VCR unit (see section 1.6.2).
- (2) Remove the 4 screws ⑤.
- (3) Now the DV MAIN board can be removed.

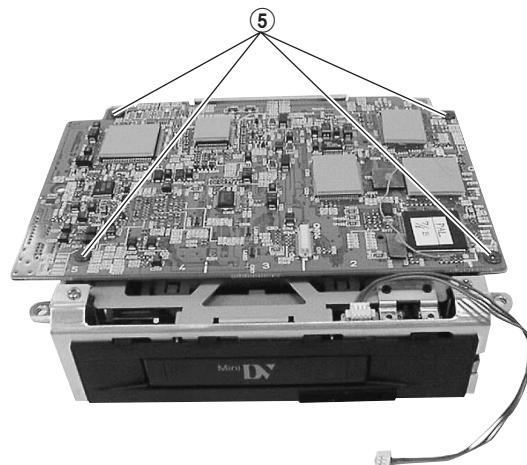


Fig. 1-6-3(1)

(4) After removing the DV MAIN board, leave it standing up by fitting it into the notches on the unit frame, as shown in the figure.

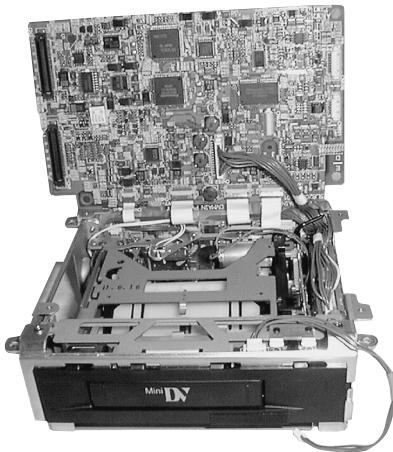


Fig. 1-6-3(2)

(3) Unplug the power cable that supplies power from the battery case to the main unit, from the connector **C**.

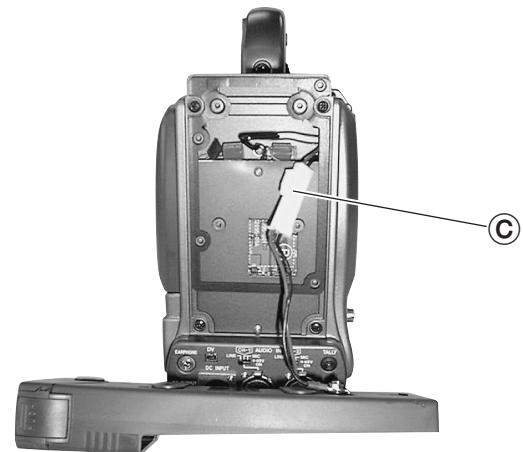


Fig. 1-6-4(3)

1.6.4 Removing the Battery Case

- (1) Remove the 2 screws **①** and remove the rear cover of the battery case.
- (2) Remove the 4 screws **②** and remove the battery case from the main unit.



Fig. 1-6-4(1)

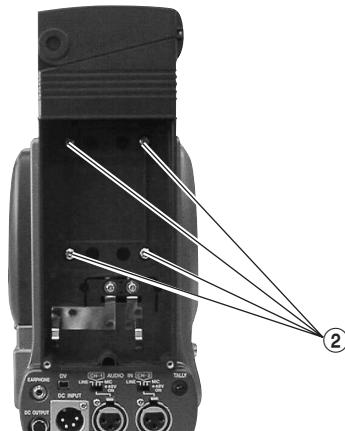


Fig. 1-6-4(2)

1.6.5 Removing the REG Board

- (1) Remove the battery case (see section 1.6.4).
- (2) Remove the 2 screws **③** and remove the panel.



Fig. 1-6-5(1)

- (3) Remove the 2 screws **④** and remove the REG board.

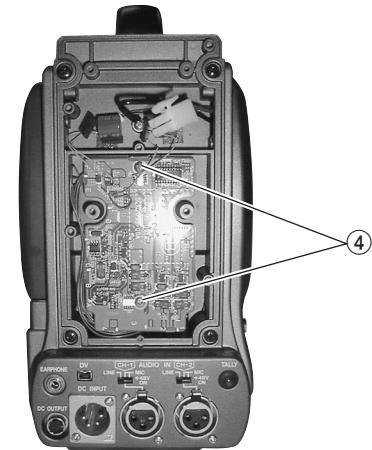


Fig. 1-6-5(2)

1.7 DISASSEMBLY OF THE VCR UNIT

The mechanism unit incorporated in the unit can be disassembled as described below. Note that the following description deals only with the method of removing the mechanism unit from the VCR unit.

1.7.1 Disassembling the Front Part of the Unit

- (1) Remove the VCR unit from the camera (see section 1.6.2).
- (2) Remove the DV MAIN board (see section 1.6.3).
- (3) Remove the 2 screws ① and remove the stay on the front cover. The cover of the cassette insertion slot will come out together with it.

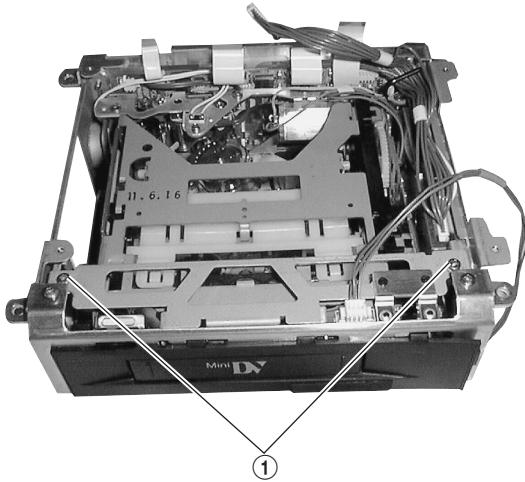


Fig. 1-7-1(1)

- (4) Remove the 2 screws ② and remove the front stay.

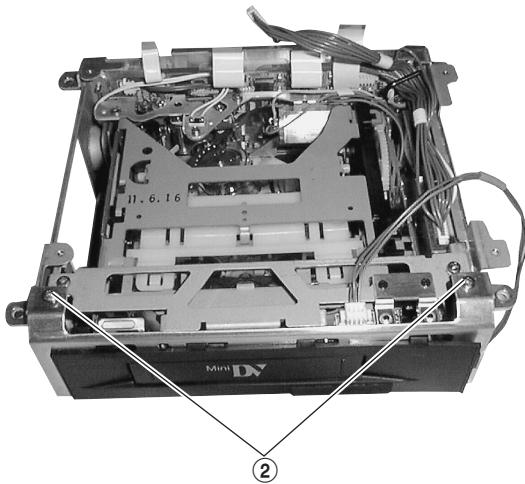


Fig. 1-7-1(2)

1.7.2 Disassembling the Rear Part of the Unit

- (1) Remove the 2 screws ③ and remove the rear side stay.

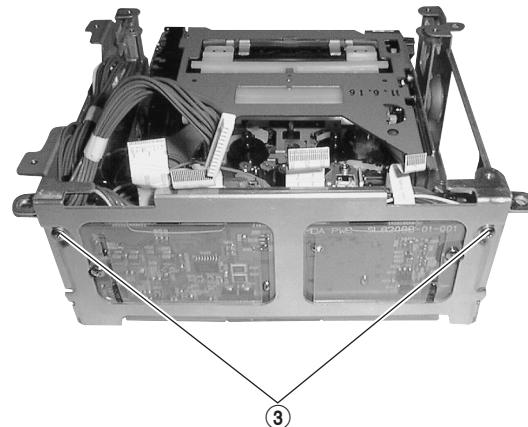


Fig. 1-7-2(1)

- (2) Remove the 2 screws ④ and remove the active head cleaner. During this operation, be careful not to apply excessive force to the wire that is connected between the active head cleaner assembly and CN609 on the PR & MDA boards.

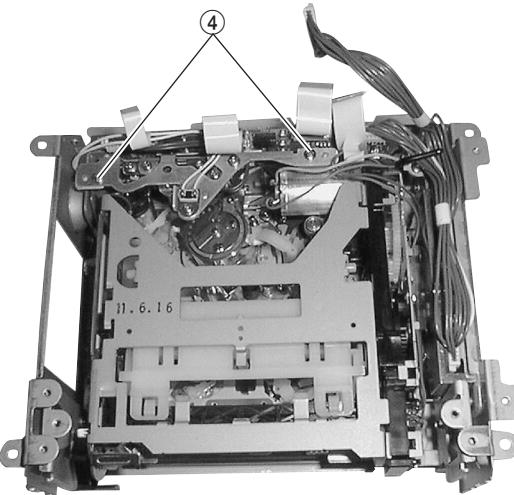


Fig. 1-7-2(2)

- (3) Remove the 2 screws ⑤ and remove the side stays.

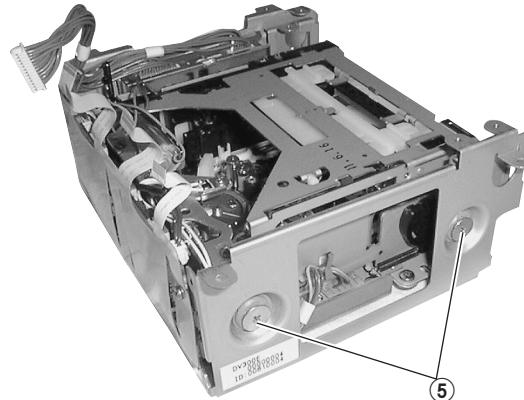


Fig. 1-7-2(3)

(4) Insulators (blue) are attached to the retaining screws. Be sure to attach the insulators when re-assembling the side stays.
 (5) The side stays to both sides are attached in the same way. Remove the 2 screws ⑥ and remove the side stays.

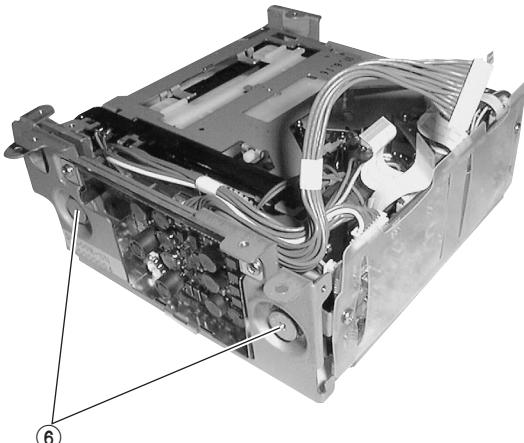


Fig. 1-7-2(4)

(6) After removing the rear stays and side stays (left and right), remove the 2 screws ⑦ then remove the PR & MDA board. When removing the PR & MDA boards, be careful not to damage the wires and FFCs connecting them to the deck assembly housing motor and power supply board.

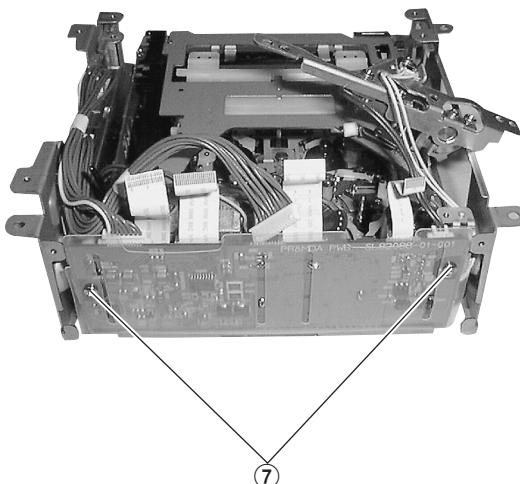


Fig. 1-7-2(5)

1.7.3 Removing the Cassette Housing Assembly

(1) Remove the 2 screws ⑥ and remove the cassette housing assembly.

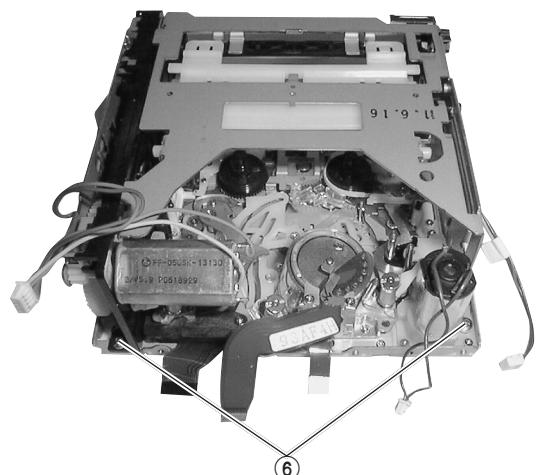


Fig. 1-7-3

1.7.4 Removing the Mechanism Unit

(1) Remove the 3 screws ⑧. This allows the mechanism unit to be removed from the stays. When it is required to disassemble the mechanism unit itself, see SECTION 2.

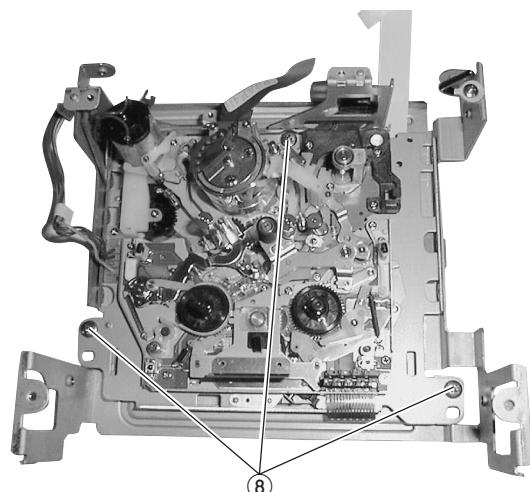


Fig. 1-7-4(1)

(2) When the remove the mechanism unit completely, also remove the connector ⑨ from the rear.

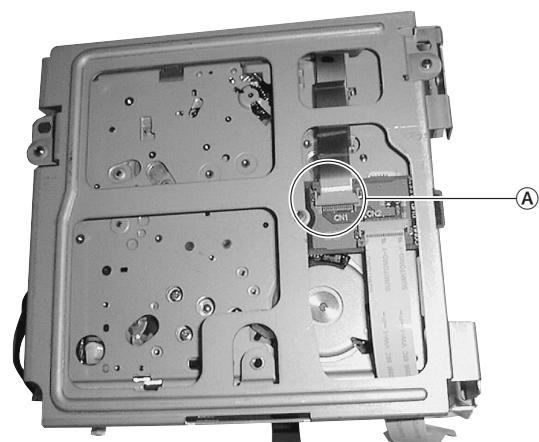


Fig. 1-7-4(2)

1.8 TAPE EJECTION IN CASE OF EMERGENCY

When the cassette tape cannot be ejected normally, take it out by the following methods.

1.8.1 Tape Ejection Using Forced Eject Mode (Short-circuiting of Internal TP)

GY-DV500 is provided with a compulsory eject mode for use in case the button operations are not accepted due to a malfunction of the mechanism control circuitry. When an attempted operation of the operation buttons is not accepted, set the compulsory eject mode as described below before removing the tape.

CAUTION

- This mode is effective only when the electrical and mechanical systems of the mechanism unit are normal and a tape ejection operation is not accepted due to a problem of the electrical system.
- If there is a problem in the mechanical system of the unit, this mode may be ineffective. If compulsory ejection is performed in such a case, the tape could be damaged or cut.

- (1) Remove the left side cover (see section 1.2.1).
- (2) With the power supply on, short-circuit TP107 on the DV MAIN board with the GND using a wire, etc.
- (3) Forced ejection is activated to eject the tape.

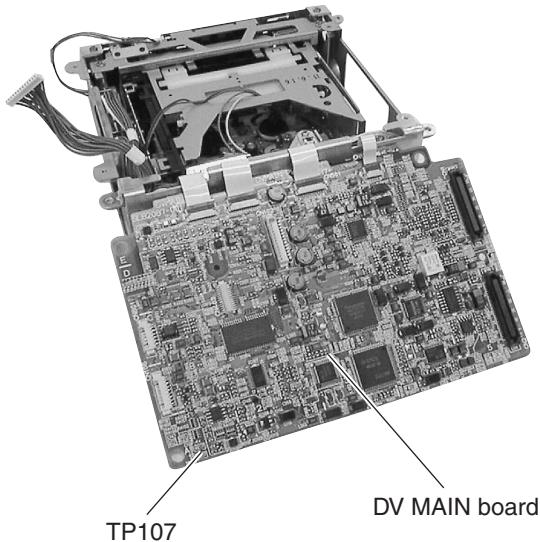


Fig. 1-8-1

1.8.2 Tape Ejection without Using the Forced Eject Mode

Activate the loading motor by applying DC voltage to its two terminals.

NOTE

When a forced ejection is not accepted because the loaded cassette tape cannot be ejected due to a fault in the electrical system or because of some problem in the mechanism unit, eject the tape by using the following procedure. However, as this mode drives the loading motor, it assumes that the mechanical system is operating normally.

- (1) Turn off the power supply to the unit.
- (2) Flip open the DV MAIN board to expose the mechanism (see section 1.6.3).

- (3) Apply 3 V DC to the electrodes at the top of the loading motor (red wire to + pole, brown wire to - pole) to unload the tape. Unload it little by little because it could be damaged or contaminated by grease if the pole base assemblies are returned completely beyond the position of the tape.

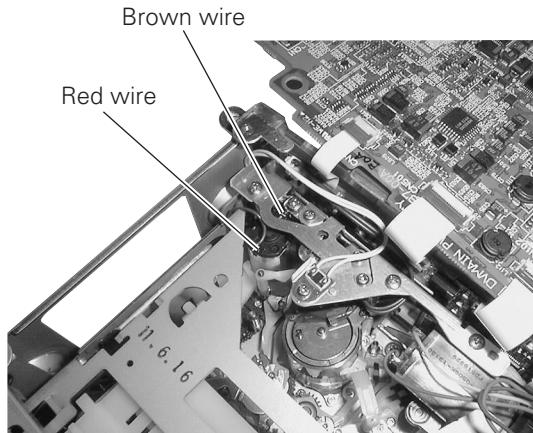


Fig. 1-8-2(1)

- (4) If the tape slackens, take it up by rotating the shaft at the top of the capstan motor in the direction of the arrow using a sharp-tipped object (chip IC replacement tool, etc.).
- (5) Repeat steps (3) and (4) above until the tape is taken up completely.
- (6) After confirming that the tape has been taken up completely, rotate the gear of the cassette housing assembly in the direction of the arrow in order to eject the cassette tape.

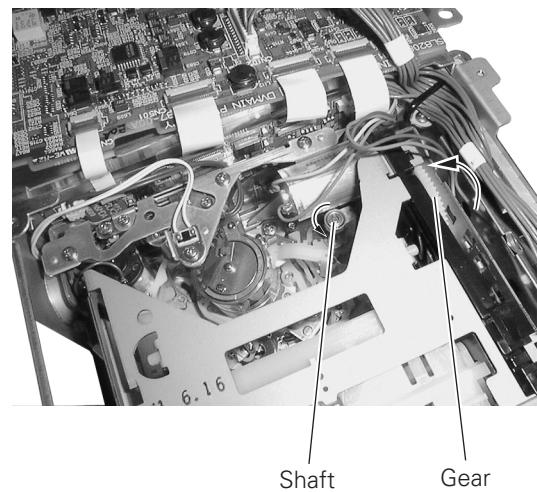


Fig. 1-8-2(2)

1.8.3 Manual Tape Ejection

If the loading motor cannot be run by the procedure outlined in section 1.8.2, the mechanism may be defective. When the loading motor is defective, remove the tape as described below.

- (1) Remove the mechanism unit from the main unit. See section 1.6.2 for the removal method.
- (2) After removing the mechanism unit, remove the DV MAIN board (see section 1.6.3).
- (3) Remove the 2 screws and remove the active head cleaner assembly (see section 1.7.2).
- (4) Remove the side cover to easy operation (see section 1.7.2).
- (5) Remove the 2 screws and remove the rear panel from the side of the PR & MDA board.

Carefully unplug the wires so as not to damage them, then remove the PR & MDA board (see section 1.7.2).

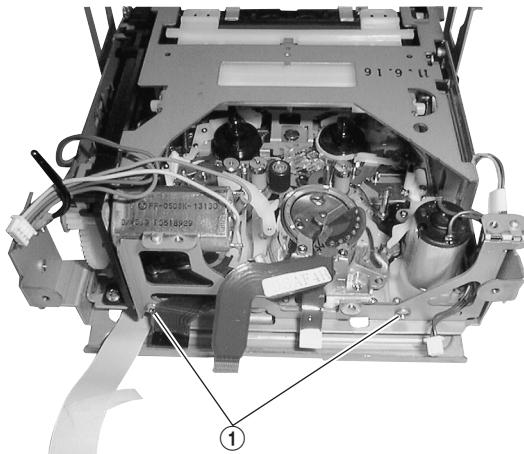


Fig. 1-8-3(1)

- (6) Remove the 2 screws ① and remove the active head cleaner stay.

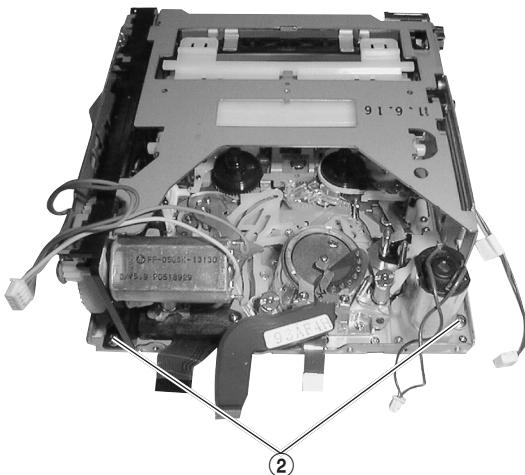


Fig. 1-8-3(2)

- (7) Loosen the 2 screws ② so that the cassette housing is separated freely.
- (8) Remove the 4 screws ③ and remove the loading motor.

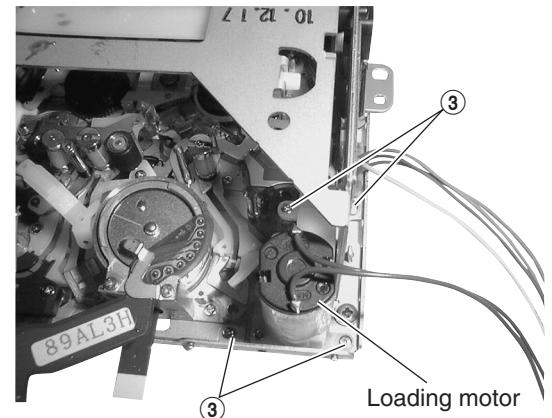


Fig. 1-8-3(3)

- (9) Unload the pole base assemblies by rotating the gear shown in the figure in the direction of the arrow.

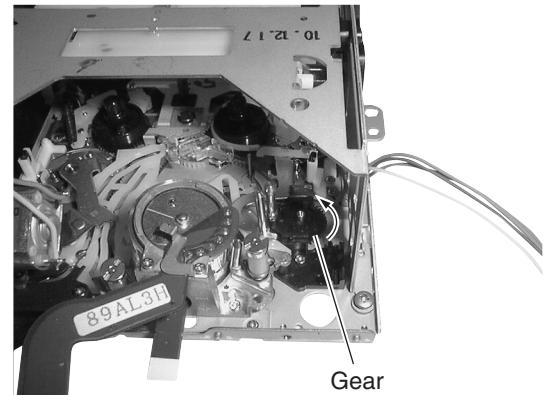


Fig. 1-8-3(4)

- (10) The pole base assemblies should be unloaded little by little. If they are returned completely beyond the position of the tape, the tape may slacken and become damaged or stained by grease.
- (11) If the tape slackens, take it up by rotating the shaft on the top of the capstan motor in the direction of the arrow using a sharp-tipped object (chip IC replacement tool, etc.) (see section 1.8.2-(4)).
- (12) Repeat steps (9) and (10) above until the tape is taken up completely.
- (13) After confirming that the tape has been taken up completely, tighten the cassette housing retaining screws which were loosened in step (6).
- (14) Attach and clamp the cassette housing again, then rotate the gear of the housing assembly in the direction of the arrow to eject the cassette tape in the same way as in section 1.8.2-(6).

1.9 CAUTION FOR REPLACING THE DV MAIN BOARD AND VIDEO SYSCON BOARD

When the DV MAIN board or VIDEO SYSCON board has been replaced for servicing, be sure to enforce the following items.

1.9.1 DV MAIN Board

[A] About the ID Management Label

Each VCR unit carries an ID label in compliance with IEEE1394 showing the unique ID assigned on the production line. (See the following figure for the label position.)

When replacing the DV MAIN board, remove the ID management label that was provided originally with the unit from the defective board and attach it in the same position to the new board.

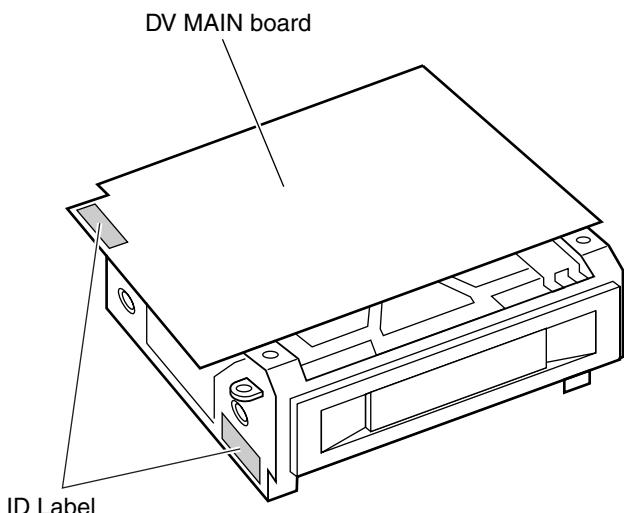


Fig. 1-9-1

[B] Load EEPROM Internal Data

The EEPROM provided with the new board for replacement contains no data, while the EEPROM originally provided with the VCR unit contains the IEEE1394 ID data as well as all adjustment data written in the assembly and adjustments written on the production line. This means that the new VCR unit will not function if the new EEPROM is used in the condition in which it is delivered.

When replacing the DV MAIN board, load the internal data of the EEPROM on the original board to the EEPROM of the new board.

(1) How to use original EEPROM to new DV MAIN board.

Remove the EEPROM from the original DV MAIN board, and attach the chip to the new board.

(2) How to write data from the original board to the new EEPROM

How to load all parameters in EEPROM on original board to new EEPROM by using the adjustment software.

(For details, see section 3.7.13)

(3) In case of original EEPROM on the original DV MAIN board was broken.

Load the default data before making adjustments with the adjustment software, write the data in the new EEPROM, then make adjustments by following the adjustment procedures. (See section 3.7.12 for details.)

And then, input the ID number on the original board to new EEPROM by using the adjustment software. (See section 3.7.13 for details.)

1.9.2 VIDEO SYSCON Board

[A] Transporting of IC407 (EEPROM) Data

When the SSF function is used, the cassette number recorded on tape (see section 9.4.1) has the model ID code appended to it. The model ID code is written in IC407 (EEPROM). However, as the new EEPROM mounted on the new replacement circuit board does not have the ID code written into it, the SSF function cannot work normally (the model ID code should be written in IC407 for the correct operation of the SSF function).

Nevertheless, no means is provided for transporting the model ID code from the original EEPROM to the new EEPROM. Therefore, it is recommended to remove the original IC from the original board and mount it on the new board.

[B] ID Management Label

An ID management label is attached to the camera head. For the position, see Fig. 1-4-1.

1.10 FUNCTIONS OF INTERNAL SWITCHES

1.10.1 DIP Switch S901 on ROM Board

Symbol	No.	Name	Function	Shipment
S901	1	Adjustment mode	Adjustment mode ON/OFF	OFF
	2	Check mode	Check mode ON/OFF	OFF
	3	Not used		OFF
	4	Character mixing	TEST OUT character display ON/OFF	OFF
	5	Not used		OFF
	6	Color matrix adjustment	Color matrix adjustment mode ON/OFF	OFF
	7	Setup (NTSC model only)	ON (0% setup)/ OFF (7.5% setup)	OFF
	8	Function setting	Initial setting of camera functions	OFF

Table 1-10-1

(1) Adjustment mode (S901-1)

Set S901-1 to ON to initiate the camera electrical adjustment mode.

For details, see section 3.3.

(2) Check mode (S901-2)

Set S901-2 to ON to display the camera's check mode screen on the viewfinder.

In this mode, the auto white balance and auto iris control data in the microcomputer controlling the camera can be viewed and checked. (This mode is not used for adjustments but is intended to simply allow the checking of control values and their functions.)

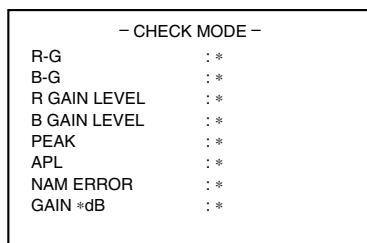


Fig. 1-10-1(1)

R-G/B-G

Shows the data on the R/G/B signals input to the CPU for use in white balance control in terms of R-G and B-G. The values are variable between -127 and 128.

These values approach 0 if the white balance circuit is activated by capturing a non-color image such as a gray scale.

R GAIN LEVEL/B GAIN LEVEL

Show the levels of the R and B channel white balance control signals.

These values are variable between 0 and 255.

The R value tends to decrease and the B value tends to increase under low color temperatures (reddish lighting), and the R value tends to increase and the B value tends to decrease under high color temperatures (bluish lighting).

PEAK

Shows the peak hold value of the video signal in a vertical scanning period.

APL

Shows the average picture signal level.

NAM ERROR

Shows the NAM value used in the auto iris control.

The value is variable between -127 and 128.

The value approaches 0 when the auto iris control approaches the optimum level.

GAIN

Shows the electrical gain value set with the GAIN switch on the right-hand side of the unit.

Shows "ALC" in the full auto-shooting mode.

(3) Character mixing (S901-4)

Set S901-4 to ON to superimpose the same characters as those displayed on the viewfinder-screen in the output signal from the TEST OUT terminal. This is a convenient facility for adjustment because the adjustment menu and screen can be displayed on an external monitor.

(4) Color-matrix adjustment (S901-6)

Set S901-6 to ON to view the color-matrix adjustment-mode screen on the Viewfinder-screen.

This mode makes it possible to set color-matrix parameters in details (see section 1.12).

* Note that the color-matrix adjustment is not a normal adjustment item. It is usually not required to adjust the color-matrix because this has been set to the optimum level before shipment.

* In case a color-matrix adjustment becomes necessary because of a user's request, it should be performed in accordance with the description in section 1.2.

(5) Setup (S901-7): NTSC only

Set S901-7 to ON or OFF to select whether or not the output signal setup is included in the TEST OUT and MONITOR OUT terminals output.

(Note that the signal recorded onto tape is not affected by the position of this switch. The signal is always recorded without the setup information.)

As changing the position of this switch does not alter the signal level, it is not necessary to re-adjust the signal recording according to the position of this switch. This switch is effective only on the camera video output. With the video signal obtained by playing back a previously recorded tape, whether the setup is included or not can be selected with the item "SETUP" in the Service Menu (see section 1.13.3).

(6) Function setting (S901-8)

This switch is used to set the functions shown in Table 1-9-1(2).

This switch is usually used to switch the defaults of the domestic and export-oriented models.

Function		S901-8		
		NTSC		PAL
		OFF	ON	Do not care
GAIN	L	0 dB	0 dB	0 dB
	M	6 dB	9 dB	9 dB
	H	9 dB	18 dB	18 dB
V. SCAN		60.1 to 251.3	60.1 to 2067.0	50.1 to 2053.6
ALC GAIN		0 to + 18 dB	0 to + 18 dB	0 to + 18 dB

Table 1-9-1(2)

* The L/M/H positions of GAIN can also be set individually using the [CAMERA MENU].

1.11 MODES REQUIRED IN SERVICING

1.11.1 Camera Service Menu

The CAMERA SERVICE MENU can be displayed on the viewfinder screen by setting the [POWER] switch to ON while tilting the AUTO WHITE/ACCU FOCUS switch upward (toward AUTO WHITE).

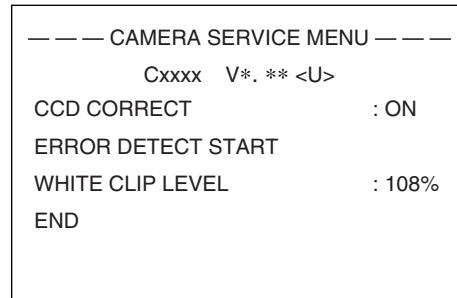


Fig. 1-11-1

Select an item by turning the SHUTTER dial, and push the SHUTTER dial to select or set it.

Cxxxx V*.**<U>

This item displays the version number of the camera control software (IC902 on ROM board).

* The Character "U" after the Version No. indicates that U version software is running. When "E" is shown here, the software for E version is running.

CAUTION

Also be sure to reset the system after replacing IC902 (ROM) on the ROM board. See section 1.11.2, "System Reset".

CCD CORRECT (ON/OFF)

This item sets whether white blemish due to CCD is to be corrected or not.

To correct : ON

Do not correct : OFF

The factory shipment condition is ON. Even when OFF is selected with this menu, it is temporary and the correction status (ON) is recalled automatically the next time the power is turned on.

NOTE

- To correct any white blemish interference produced after the factory shipment, perform the "ERROR DETECT START" described on the next page. Be sure to warm up the camera by leaving it on for more than 2 hours before performing the "ERROR DETECT START".

- The white blemish correction is performed with the lens iris closed or with the lens cap on. In normal use, the lens iris closes automatically when performing a white blemish correction. However in a case when the lens cable is disconnected and the lens iris cannot be closed, "ERROR DETECT FAIL" will be displayed on the viewfinder and the white blemish correction cannot be executed. Before performing the white blemish correction again, be sure to first close the lens.

ERROR DETECT START

When this item is selected and the SHUTTER dial is pushed, the white blemish detection for correcting CCD white blemish starts automatically.

The following messages are displayed on the viewfinder screen during detection.

ERROR DETECT EXECUTING
↓
ERROR DETECT END

After the completion of error detection, the camera is automatically set to the white blemish correction ON condition.

The following types of white blemish can be corrected.

(1) White blemish correction target area

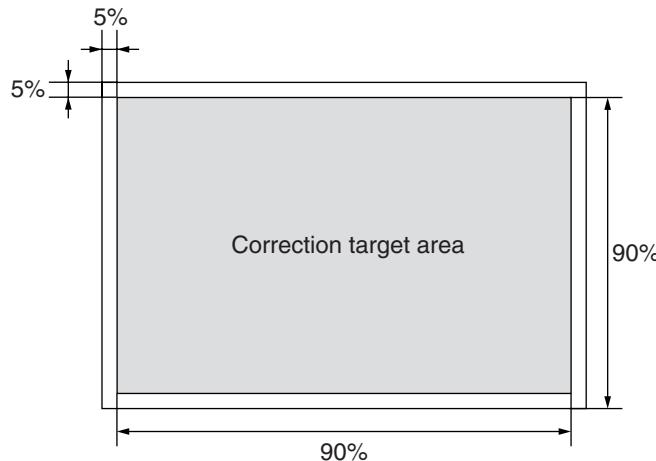


Fig. 1-11-2

(2) Details of correctable white blemishes

- White blemishes at luminance levels of 30 mV or more can be corrected. The total number of white blemishes that can be corrected is up to 7 for the R, G and B signals.
- Even when there are 2 white blemishes on a single scanning line, both of them can be corrected. (However, when they are adjacent, the results of a correction appear inferior to those of the results of the correction of a single white blemish. These results are due to the correction characteristics themselves.)

WHITE CLIP

The white clip level of the through-camera composite output signal that is output at TEST OUT can be selected from the following 2 values:

100% or 108% (shipment setting)

1.11.2 System Reset

While pushing the [SHUTTER] dial, press the [POWER] switch to ON. This resets the system and initializes the menu set items to their default values.

The following description shows items that are initialized to the defaults by a system reset and those that are not.

1.11.3 Resetting DSP Data

While pushing the [SHUTTER] dial and [STATUS] switch tilted toward "SKIN AREA", press the [POWER] switch to ON. This resets the internal setting data (color matrix setting data) in the DSP to the default setting.

1.11.4 Displaying Auto Iris Area Gate

While holding the [AUTO WHITE/ACCU FOCUS] switch down (toward ACCU FOCUS), press the [POWER] switch to ON. The area gate for the auto iris control is displayed in the viewfinder screen.

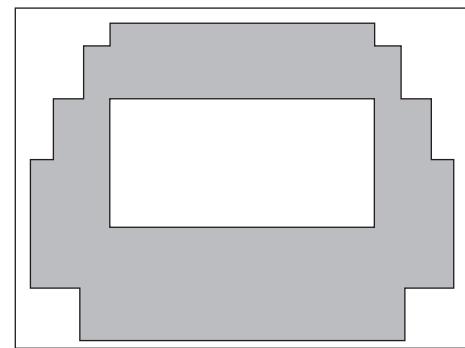


Fig. 1-11-3

1.11.5 List of Servicing Switches (Camera)

The following table that shows the switches described above is for use in servicing. Use this table as a reference in servicing.

Switch Operation	Result
[AUTO WHITE] + [POWER] ON	Service menu display
[SHUTTER] + [POWER] ON	System reset
[STATUS] + [SHUTTER] + [POWER] ON	DSP data reset
[ACCU FOCUS] + [POWER] ON	Area gate display

Table 1-11-4

1.11.6 EEPROM in Camera

IC905 on the CAM1 board is an electrically erasable/rewritable EEPROM. It stores the following data.

- Camera adjustment data set in the adjustment mode.
- Settings in [CAMERA MENU].
- White blemish position coordinate data for use in white blemish correction.
- Auto white balance control data (A/B).
- Camera status at the last power OFF (positions of non-lock type switches, etc.).

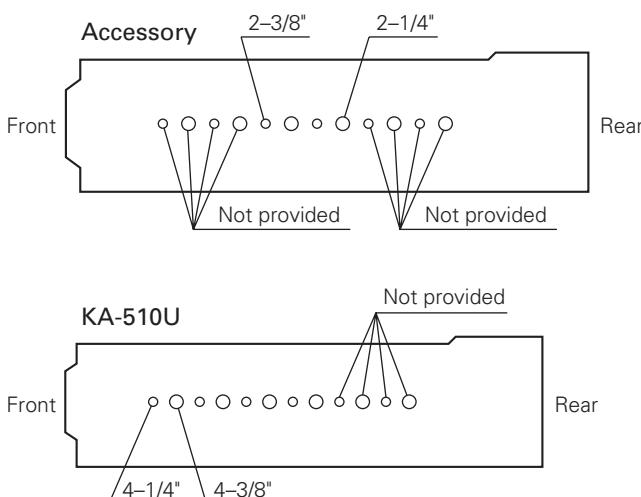
Therefore, when retention of the above data becomes impossible due to a failure in the EEPROM or over the 1 million times of rewrite count, the EEPROM should be replaced with a new one and the data should then be re-set in it.

1.11.7 Tripod base

See the KA-510U service manual NO. 60065 for servicing. The tripod is not exactly same as KA-510U. See note for the difference.

Note

These 1/4 and 3/8 inch fixing tripod holes are not provided for the KA-510U.



1.12 CHANGING THE COLOR MATRIX SETTING

NOTE

The color reproduction properties of the color-matrix circuit built into the DSP can be re-set by varying the values of 9 parameters. However, as these parameters have been set at the factory to the default values based on detailed studies of the product development process, it is usually not recommended to alter them. Note that this adjustment is not a normal electrical adjustment item.

Should a re-adjustment of the color matrix (a color reproducibility change) be required as a result of a user request, etc., this should be performed only after studying and understanding the details of the following instructions.

1.12.1 Setting the Color Matrix

Preparation

The color matrix setting requires a color chart for use as a reference for color reproduction and a vectorscope. As we do not specify a color chart for this purpose, discuss the matter with any user requesting a custom setting and use a color chart to be agreed by the user.

Adjustment

The color-matrix circuit can be set using menus displayed on the screen (the viewfinder-screen or the test out screen).

MODE	:	M3	M2	M1	DATA
R※(R-G)	:	※	※	※	※
R※(R-B)	:	※	※	※	※
G+(G-R)	:	X	※	※	※
G-(G-R)	:	※	X	※	※
G+(G-B)	:	X	※	※	※
G-(G-B)	:	※	X	※	※
B+(B-G)	:	X	※	※	※
B-(B-G)	:	※	X	※	※
B※(B-R)	:	※	※	※	※

Fig. 1-12-1

Use the following procedure.

- (1) Remove the right side cover (see section 1.3.1)
- (2) Set DIP switch S901-6 on the ROM board to ON to display the color-matrix setting menu on both the viewfinder and testout screens.
- (3) Move the cursor (mark of "■") to the desired item by using the [SHUTTER] dial.
- (4) When the cursor set on the desired item, pushing the [SHUTTER] dial causes the selected item to blink. (This is the status of the value adjustment.)
- (5) When the adjustment value is blinking, rotating the [SHUTTER] dial varies the adjustment value. The available adjustment values are "M3", "M2", "M1" which is 0 or 1, and "DATA" which is between 0 and 31.

(6) Set DIP switch S901-6 on the ROM board to OFF. The color matrix setting menu is canceled and the normal screen appears again.

NOTE

The settings are stored and reflected every time a value in an item is changed. The setting values marked "X" do not need to be changed.

NOTE

If the [STATUS] switch is pressed during the value of some adjustment item is blinking, all of the data being set is reset to the default values.

1.12.2 Details of Setting Items

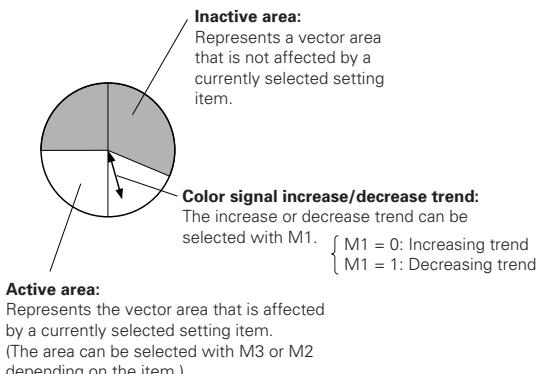
As described above, the color matrix setting consists of varying 12 items using 9 parameters. The following table shows a comparison of the setting items.

NOTE

The model diagrams in the table may be interpreted as follows.

(Example)

This diagram represents the display area of the vectorscope.



MODE	Active Area Graph display	M3 0 : Active 1 : Inactive	M2 0 : Active 1 : Inactive	M1 0 : Increase 1 : Decrease	DATA 0 - 31
R±(R-G)	M3 	→ 0 or 1			0 or 1 ※
	M2 		→ 0 or 1		
R±(R-B)	M3 	→ 0 or 1			0 or 1 ※
	M2 		→ 0 or 1		
G+(G-R)	M2 	×		→ 0 or 1	0 or 1 ※
	M3 	→ 0 or 1			
G-(G-R)	M3 	→ 0 or 1		×	0 or 1 ※
	M2 		→ 0 or 1		
G+(G-B)	M2 	×		→ 0 or 1	0 or 1 ※
	M3 	→ 0 or 1			
G-(G-B)	M3 	→ 0 or 1		×	0 or 1 ※
	M2 	×		→ 0 or 1	
B+(B-G)	M2 	×		→ 0 or 1	0 or 1 ※
	M3 	→ 0 or 1			
B-(B-G)	M3 	→ 0 or 1		×	0 or 1 ※
	M2 	×		→ 0 or 1	
B±(B-R)	M3 	→ 0 or 1			0 or 1 ※
	M3 	→ 0 or 1			

Table 1-12-1

1.13 SERVICE MENU

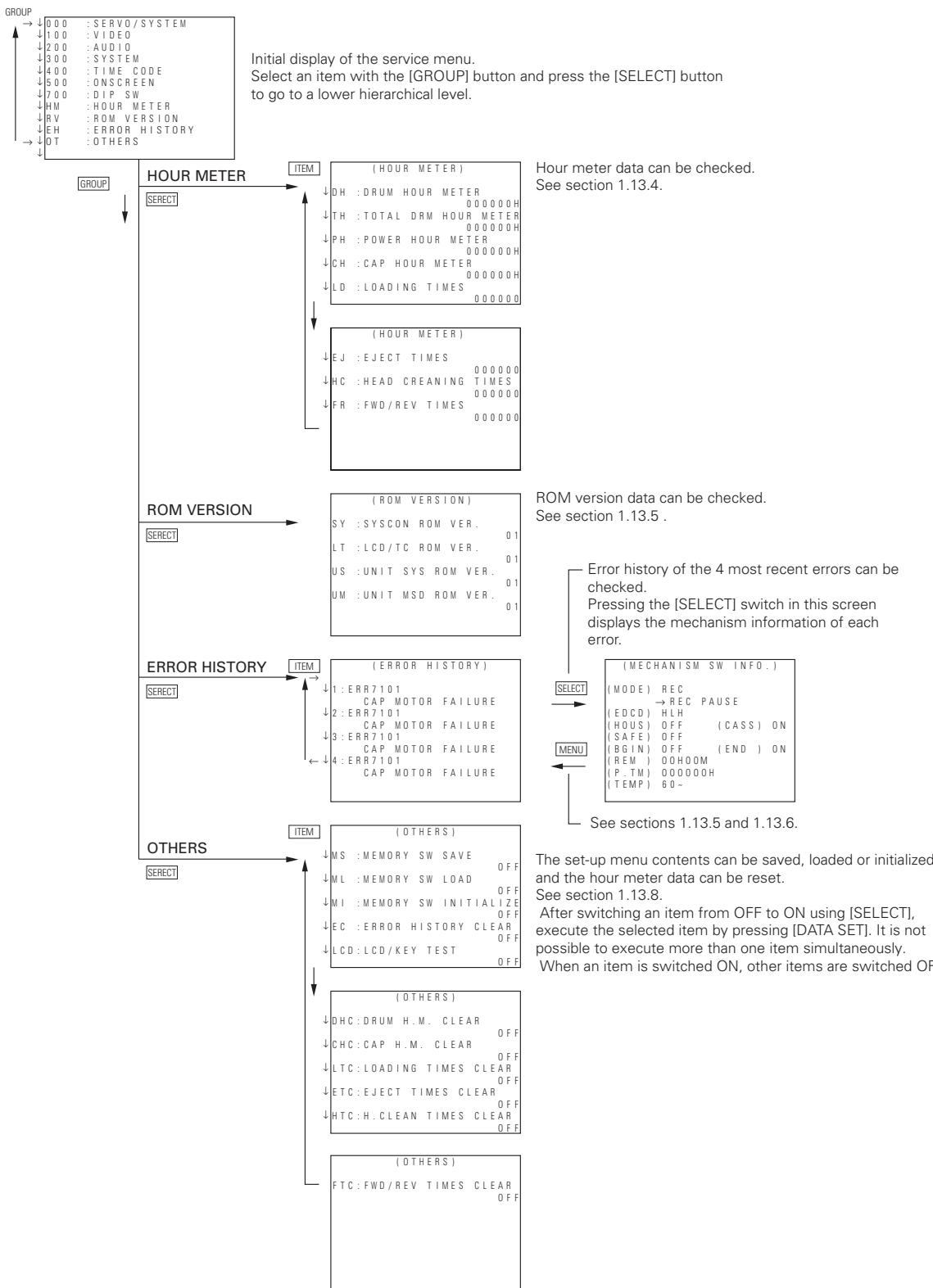
1.13.1 Operation Method

When the [MENU] button is pressed, the setup menu appears on the viewfinder screen to allow the user to perform setups. (For the contents of the setup menu, refer to page 66 of the instruction manual). Then, with the setup menu displayed, press the [MENU] button while holding down the [LOG] button to display the service menu.

To change a menu setting value, press the [DATA SET] button. The viewfinder screen and counter display show the blinking "DATA SET" indicators and the set returns to normal mode.

To return to the setup menu, turn the power off and then on again.

1.13.2 Configuration of the Service Menu (Displayed on the Viewfinder Screen)



1.13.3 Contents of Service Menu

Group	Item	Settings	Counter Display	Factory Default	Description
000 SERVO/ SYSTEM	002: OPERATION LOCK	ON OFF	002 01 00	OFF	Operation lock setting.
	050: REMOTE SELECT	LOCAL IEEE1394 RS232C	rNL Lc ,E 23	LOCAL	User setup menu (Refer to page 68 of the instruction manual.)
	080: BATTERY SHUTDOWN V	10.5 – 11.0V (0.1V step)	bE 105	10.5V	Battery empty detection voltage setting.
	081: BATTERY ALARM V	10.5 – 12.0 V (0.1V step)	bR 110	11.0V	Battery alarm detection voltage setting.
	082: BACK TALLY MODE	BLINK OFF ON	rEld bL oFF on	BLINK	User setup menu (Refer to page 68 of the instruction manual.)
	083: FRONT TALLY MODE	BLINK ON	083 03 01	BLINK	Select the front tarry BLINK: Blinking ON: Lighting
100 VIDEO	125: SET UP (Only U-ver.)	OFF ON	125 00 01	ON	Select the setup of MONITOR OUT in playback mode. ON: Setup added. OFF: No setup.
	126: INPUT SELECT	CAMERA IEEE1394	ud cfl ,E	CAMERA	Input signal selection User setup menu (Only U-ver.) (Refer to page 68 of the instruction manual.)
200 AUDIO	244: LOW CUT	OFF CH1 CH2 CH1&CH2	LctF oF 01 02 on	OFF	User setup menu (Refer to page 68 of the instruction manual.)
	245: SAMPLING RATE	32K 48K	5NPL 48 32	48K	User setup menu (Refer to page 68 of the instruction manual.)
	246: FRONT VOLUME ENABLE	DISABLE ENABLE	Frl oF on	ENABLE	User setup menu (Refer to page 68 of the instruction manual.)
300 SYSTEM	303: WARNING DISABLE	ENABLE DISABLE	303 00 01	ENABLE	ENABLE: Warning enabled. DISABLE: Warning disabled.
	305: REC REPEAT	OFF ON	305 00 01	OFF	OFF: REC Full Repeat enabled. ON: REC Full Repeat disabled.
	306: LONG PAUSE DISABLE	ENABLE DISABLE	306 00 01	ENABLE	ENABLE: Long pause is canceled after specified period of time (set using Menu 307). DISABLE: Long pause is not canceled.
	307: LONG PAUSE TIME	3MIN 30MIN	LGPt 03 30	30MIN	User setup menu (Refer to page 68 of the instruction manual.)
	396: BATTERY TYPE	12V 13.2V 14.4V	bRtt 12 13 14	12V	User setup menu (Refer to page 68 of the instruction manual.)
	398: SSF MODE	OFF CUE MODE MARK MODE	55F oF cU M	CUE MODE	User setup menu (Refer to page 68 of the instruction manual.)
400 TIME CODE	406: USERS BIT GROUP	NOT SPECIFIED ISO CHAR UNASSIGNED1 UNASSIGNED2	40b 00 01 02 03	NOT SPECIFIED	User bit's binary group flag setting
	416: NON DROP/DROP (Only U-ver.)	DROP NON DROP	tcG dF nF	DROP	User setup menu (Refer to page 68 of the instruction manual.)
500 ON SCREEN	515: CALENDAR SELECT	JAPAN USA EUROPE	515 00 01 02	U-ver: USA E-ver: EUROPE	Calendar display format selection. JAPAN: Year/Month/Day USA: Month/Day/Year EUROPE: Day/Month/Year
	516: DISPLAY SELECT	TC CLOCK	dSP tc cL	TC	User setup menu (Refer to page 68 of the instruction manual.)

Group	Item	Settings	Counter Display	Factory Default	Description
700 DIP SW	700: DIP SWITCH-0	OFF ON	100 00 01	OFF	Operate LED display switching OFF: Blinks in amber when the cassette cover is opened. ON: Extinguished when the cassette cover is opened.
	701: DIP SWITCH-1	OFF ON	101 00 01	OFF	OFF: Other operations than ejection are inhibited when the cassette cover is opened. ON: Operations are valid even when the cassette cover is opened.
	702: DIP SWITCH-2 to 715: DIP SWITCH-15	OFF ON	102 00 01 to 715 00 01	All OFF	Switching inhibited. Must be set to OFF.

Operations are not accepted when the cassette cover is open. Therefore, DIP switch-0 and -1 can be used in checking the operation when the side cover is open or in the compatibility adjustment.

1.13.4 HOUR METER

This screen allows the data of hour meters to be checked.

Item	Counter Display	Description	Max. Display Hours/Count
DRUM HOUR METER	dH*****	Displays the drum rotation hours.	999999H
TOTAL DRUM HOUR METER	tH*****	Displays the total drum rotation hours. This data cannot be reset.	999999H
POWER HOUR METER	PH*****	Displays the power ON hours. This data cannot be reset.	999999H
CAP HOUR METER	cH*****	Displays the capstan motor rotation hours.	999999H
LOADING TIMES	lH*****	Displays the loading count.	999999TIMES
EJECT TIMES	ej*****	Display the ejection count.	999999TIMES
HEAD CLEANING TIMES	hc*****	Displays the active cleaning head operation count.	999999TIMES
FWD/REV TIMES	fr*****	Displays the forward or reverse operation count	999999TIMES

***** are the figures of time (or count).

1.13.5 ROM VERSION

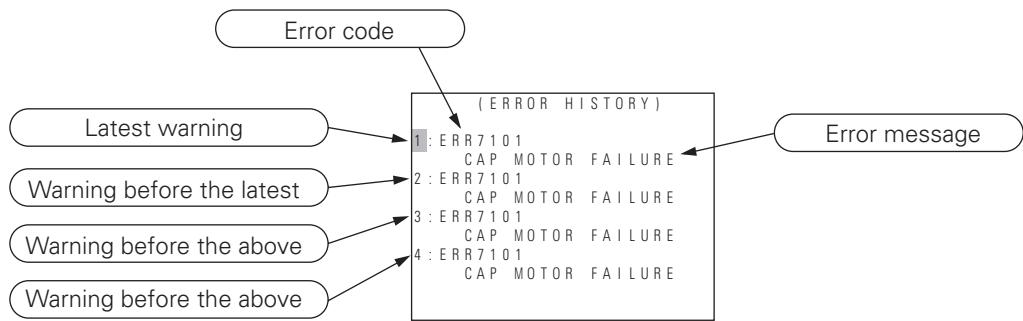
This screen allows the ROM versions to be checked.

Item	Counter Display	Board Name Symbol No.	Remark
SYSCON ROM VER.	54 **	Video/Sys-con board IC403	PLSL1063-V1-**
LCD/TC ROM VER.	6t **	Audio/LCD board IC601	UPD78P058BT***
UNIT SYS ROM VER.	U5 **	DV MAIN board IC101	MN102F1617HL-**
UNIT MSD ROM VER.	U7 **	DV MAIN board IC401 ROM board IC1 (The MSD CPU program is written in IC401 and ROM board IC1.)	M31020EAVP*** M27W102-80N6-** (The ROM version No. of PAL begins with "80".)

** is the version number.

1.13.6 ERROR HISTORY

This screen allows the history of the 4 most recent errors to be checked.



1.13.7 MECHANISM SW INFO

This screen allows the mechanism mode at each error to be displayed.

(MECHANISM SW INFO.)	
(MODE)	REC →REC PAUSE
(EDCD)	HLH
(HOUS)	OFF
(CASS)	ON
(SAFE)	OFF
(BGIN)	OFF
(END)	ON
(REM)	00H00M
(P. TM)	00000H
(TEMP)	HIGH

Display

Item	Description	Input Pin	Display
(MODE)	Mode at the moment of VCR error & mode immediately before.	—	PLAY, STILL, REC, REC PAUSE, NO CASSETTE, EJECT, STNDBY-ON, FF, REW, SHTL, STILL, SHTL X10, SHTL X-10
(ECOD)	Rotary encoder output.	DV MAIN board IC401 Pin 44 → CAM0 Pin 45 → CAM1 Pin 46 → CAM2	Shows H or L according to the mechanism position. Rotary encoder terminal (ENCD) H L H CAM0 CAM1 CAM2
(HOUS)	Cassette housing switch status.	DV MAIN board IC401 pin 27	ON : Housing inserted/ejected status OFF : Housing operating status
(CASS)	Cassette switch status.	DV MAIN board IC401 pin 32	ON : Cassette tape inserted OFF : Cassette tape not inserted or during insertion /ejection
(SAFE)	REC safety switch status.	DV MAIN board IC401 pin 47	ON : Non-recordable tape inserted, cassette tape not inserted or during insertion /ejection OFF : Recordable tape inserted
(BGIN)	Tape begin sensor status.	DV MAIN board IC401 pin 126	ON : Tape leader section detected OFF : Magnetic tape section detected
(END)	Tape end sensor status.	DV MAIN board IC401 pin 125	ON : Tape leader section detected OFF : Magnetic tape section detected
(REM)	Remaining tape at the moment of error.	—	Remaining tape time
(P.TM)	POWER HOUR METER data at the moment of error.	—	POWER HOUR METER time
(TEMP)	Set's internal temperature at the moment of error	DV MAIN board IC101 pin 75	UNDER : under 10°C NORMAL : 10 to 40°C HIGH : 40 to 60°C OVER : over 60°C

1.13.8 OTHERS

This screen allows the setup menu to be saved temporarily, loaded or initialized.

To execute an item, switch it from "OFF" (displayed as "00") to "ON" (displayed as "01") with the [SELECT] button, then press the [DATA SET] button (excluding hour meter). As switching an item "ON" switches other items automatically "OFF", it is not possible to execute more than one item simultaneously.

Item	Counter Display	Factory Default	Description
MEMORY SW SAVE	5n 00	OFF	Saves the data set with the setup menu.
MEMORY SW LOAD	Ln 00	OFF	Loads the data set for the setup menu.
MEMORY SW INITIALIZE	rn 00	OFF	Initializes the setup menu data to the factory defaults.
ERROR HISTORY CLEAR	Ec 00	OFF	Clears the error history.
LCD/KEY TEST	Lcd 00	OFF	Checks the lighting of operation key LEDs. After changing the setting to "START", press the [DATA SET] button. The viewfinder screen and LCD display show "PERFORM" and the key test mode is set. In this mode pressing an operation key, lights the corresponding LED but does not cause the VCR to operate. To exit from the key test mode, change the setting to "STOP" and press the [DATA SET] button. The viewfinder screen and LCD shows "PERFORM" and the normal mode is reset.
DRUM H.M. CLEAR	dHc 00	OFF	Resets the drum hour meter.
CAP H.M. CLEAR	cHc 00	OFF	Resets the capstan hour meter.
LOADING TIMES CLEAR	l7c 00	OFF	Resets the loading count.
EJECT TIMES CLEAR	E7c 00	OFF	Resets the ejection count.
H. CLEAN TIMES CLEAR	H7c 00	OFF	Resets the head cleaning count.
FWD/REV TIMES CLEAR	F7c 00	OFF	Resets the forward/reverse operation count

1.14 ALARM DETECTION METHODS

The unit incorporates the alarm display function, which notifies the user of the VCR status, remaining tape and remaining battery power. For the contents of the alarm display, see page 86 of the instruction manual. This section describes the methods applied for alarm detection.

Item	Description	Status After Detection	Detection Method
Servo lock error "SERVO" (Counter display) Sync inh	When the drum rotation phase is deviated by more than 10 or when the capstan motor rotation speed is deviated by more than 20%. The alarm sound is generated in REC mode. The alarm display only appears in the PLAY mode. When external sync input signal SYNC IN is disturbed, "Sync inh" (sync inhibit) is displayed.	Same mode is maintained.	The MSD microcomputer detects the drum rotation phase from the phase error between the TSR and HID signals. The capstan motor rotation speed is detected based on the CAP FG signal.
Head clog "RF" (Counter display) HeadClog	Measures the error rate during playback or quick review with RET button and displays "HEAD CLOG" when the viterbi is ON and exceeds 2000 (total).	Same mode is maintained.	—
Dew condensation "DEW"	When dew warning occurs with the VCR.	See error code "0201 DEW" in 1.16.	
Lithium battery exhaustion "Li"	When the built-in lithium battery for the timecode backup is exhausted or not installed.	Same mode is maintained.	Decrease in the battery voltage below 2.6 V.
Remaining battery	When the remaining battery power is low.	<ul style="list-style-type: none"> Battery nearly empty: Operation is maintained. Battery empty: Operation stops automatically. 	Detects the voltage at system controller pin 62.

1.15 BATTERY POWER DETECTION METHODS

The battery voltage is detected to display the remaining power on the LCD. Since the detection voltage is variable depending on the 12 V/13.2 V/14.4 V battery types, correct settings should be made with the setup menu.

Detection voltage and remaining battery display

Display	Battery Type		
	12V	13.2V	14.4V
E ████ BATT F	12.6V –	3.9V –	15.1V –
E ████ BATT F ("F" off)	12.0V – 12.5V	13.2V – 13.8V	14.4V – 15.0V
E ████ BATT F ("F" off)	11.8V – 11.9V	13.0V – 13.1V	14.2V – 14.3V
E ████ BATT F ("F" off)	11.6V – 11.7V	12.8V – 12.9V	13.9V – 14.1V
E ████ BATT F ("F" off)	11.3V – 11.5V	12.4V – 12.7V	13.6V – 13.8V
E ████ BATT F ("F" off)	11.2V	12.3V	13.4V – 13.5V
E ████ BATT F ("F" off, "BATT" blinking) (Segment blinking)	11.0V – 11.1V	11.6V – 12.2V	12.6V – 13.3V
E ████ BATT F ("F" off, "BATT" blinking) (Segment blinking)	10.6V – 10.9V	10.6V – 11.5V	10.6V – 12.5V
E ████ BATT F ("F" off, "BATT" blinking) (Segments off)	– 10.5V	– 10.5V	– 10.5V

1.16 WARNING CODES

If a problem occurs during operation, the unit diagnoses the cause by itself, provides a warning through the "warning LED" and "buzzer", and displays the diagnosis results in the counter display.

[LCD counter]

Error display appears. (**** is the error code.)

*Err-*****

[Warning LED]

The red LED blinks (at about 4 Hz).

[Buzzer]

Generates a continuous tone. However, the tone is intermittent (at about 4 Hz) in case of dew alarm.

0201 Condensation

- VCR operation

In save mode:

- If a cassette is loaded, enters the AUTO OFF mode.
- If a cassette is not loaded, the warning LED lights and the SAVE mode is maintained.

In other modes:

- If a cassette is loaded, the AUTO OFF mode is initiated.
- If a cassette is not loaded, the warning LED lights and the drum rotates. An operation is accepted after any condensation has evaporated.

•Cause : Condensation of moisture.

•Detection method : Check the voltage at the pin 124 of IC401.

DEW ON : 2.4 V or more

DEW OFF : 1.8 V or less

0601 WRONG CASSETTE TYPE

•VCR operation : The AUTO OFF mode is initiated.

•Cause : A wrong type of cassette for the computer is inserted.

•Detection method : An error in the cassette type is detected (at pins 117, 118 and 119 of IC401) after the insertion is completed.

3200 LOADING INCOMPLETE

•VCR operation : The AUTO OFF mode is initiated.

•Cause : Malfunction of the loading motor, rotary encoder or mechanism.

•Detection method : The rotary encoder output is checked (at pins 44, 45 and 46 of IC401) and an error is detected when loading has not completed in 4 seconds.

3300 UNLOADING INCOMPLETE

- VCR operation : After the first unloading error, the cassette is loaded temporarily, then unloading is retried. If the retry fails again, the AUTO OFF mode is initiated.
- Cause : Malfunction of the loading motor, rotary encoder or mechanism.
- Detection method : The rotary encoder output is checked (at pins 44, 45 and 46 of IC401) and an error is detected when unloading has not completed in 4 seconds.

4000 INTAKE INCOMPLETE

- VCR operation : The AUTO OFF mode is initiated.
- Cause : Malfunction of the cassette housing switch or cassette housing motor.
- Detection method : When completion of insertion is not detected (at pin 27 of IC401) within 3 seconds after the start.

4100 EJECTION INCOMPLETE

- VCR operation : The AUTO OFF mode is initiated.
- Cause : Malfunction of the cassette housing switch or cassette housing motor.
- Detection method : When completion of ejection is not detected (at pin 27 of IC401) within 3 seconds after the start.

5605 TAPE BEGIN/END DETECTED SIMULTANEOUSLY

- VCR operation : The AUTO OFF mode is initiated.
- Cause : Tape is cut due to abnormal tension or a mechanism defect or because the cassette was inserted while the tape was slack.
- Detection method : When both the tape begin sensor (at pin 126 of IC401) and the tape end sensor (at pin 125 of IC401) output Low level together when a cassette is loaded.

5606 SP REEL RUNAWAY DURING UNLOADING

- VCR operation : The AUTO OFF mode is initiated.
- Cause : Tape is cut due to abnormal tension or a mechanism defect or because the cassette was inserted while the tape was slack.
- Detection method : When the detected TU reel rotation count (at pin 59 of IC401) exceeds 30 revs. per sec. (1200 pulses) during unloading.

5607 TU/SUP REEL STOPPED DUE TO A CUT TAPE

- VCR operation : The AUTO OFF mode is initiated.
- Cause : Tape is cut due to abnormal tension or a mechanism defect or because the cassette was inserted while the tape was slack.
- Detection method : When the FGs from the SUP and TU reels were not detected at all (at pins 59 and 60 of IC401) during loading.

5702 TAPE END DETECTED AFTER SHORT REW

- VCR operation : The AUTO OFF mode is initiated.
- Cause : Tape is cut after the end of the tape has been detected. The mode transition of the mechanism failed.
- Detection method : When the tape end sensor output (at pin 125 of IC401) remains Low even after 3 seconds have elapsed since the start of the short REW operation following the tape end detection in play mode, etc.

5802 TAPE BEGIN DETECTED AFTER SHORT FF

- VCR operation : The AUTO OFF mode is initiated.
- Cause : Tape is cut after the end of the tape has been detected. The mode transition of the mechanism failed.
- Detection method : When the tape begin sensor output (at pin 126 of IC401) remains Low even after 3 seconds have elapsed since the start of the short FF operation following the tape beginning detection in the reverse search mode, etc.

7001 DRUM MOTOR ROTATION ERROR

- VCR operation : The AUTO OFF mode is initiated.
- Cause : Malfunction of the drum motor, MDA circuit or FG detector circuit.
- Detection method : When the drum FG has not been detected (at pin 54 of IC401) for more than 4 seconds in the drum driving mode.

7101 CAPSTAN MOTOR ROTATION ERROR

- VCR operation : The AUTO OFF mode is initiated.
- Cause : Malfunction of the capstan motor, MDA circuit or FG detector circuit.
- Detection method : When the drum FG has not been detected (at pin 55 of IC401) for more than 2 seconds in the capstan driving mode.

7202 SUP TAPE SLACK DURING CAPSTAN DRIVE

- VCR operation : The AUTO OFF mode is initiated.
- Cause : The timing belt is cut or one of the reel control parts in the mechanism is malfunctioning.
- Detection method : When the SUP reel FG has not been detected (at pin 60 of IC401) during 5 rotations of the capstan in the capstan driving mode.

7302 TU TAPE SLACK DURING CAPSTAN DRIVE

- VCR operation : The AUTO OFF mode is initiated.
- Cause : The timing belt is cut or one of the reel control parts in the mechanism is malfunctioning.
- Detection method : When the TU reel FG has not been detected (at pin 59 of IC401) during 5 rotations of the capstan in the capstan driving mode.

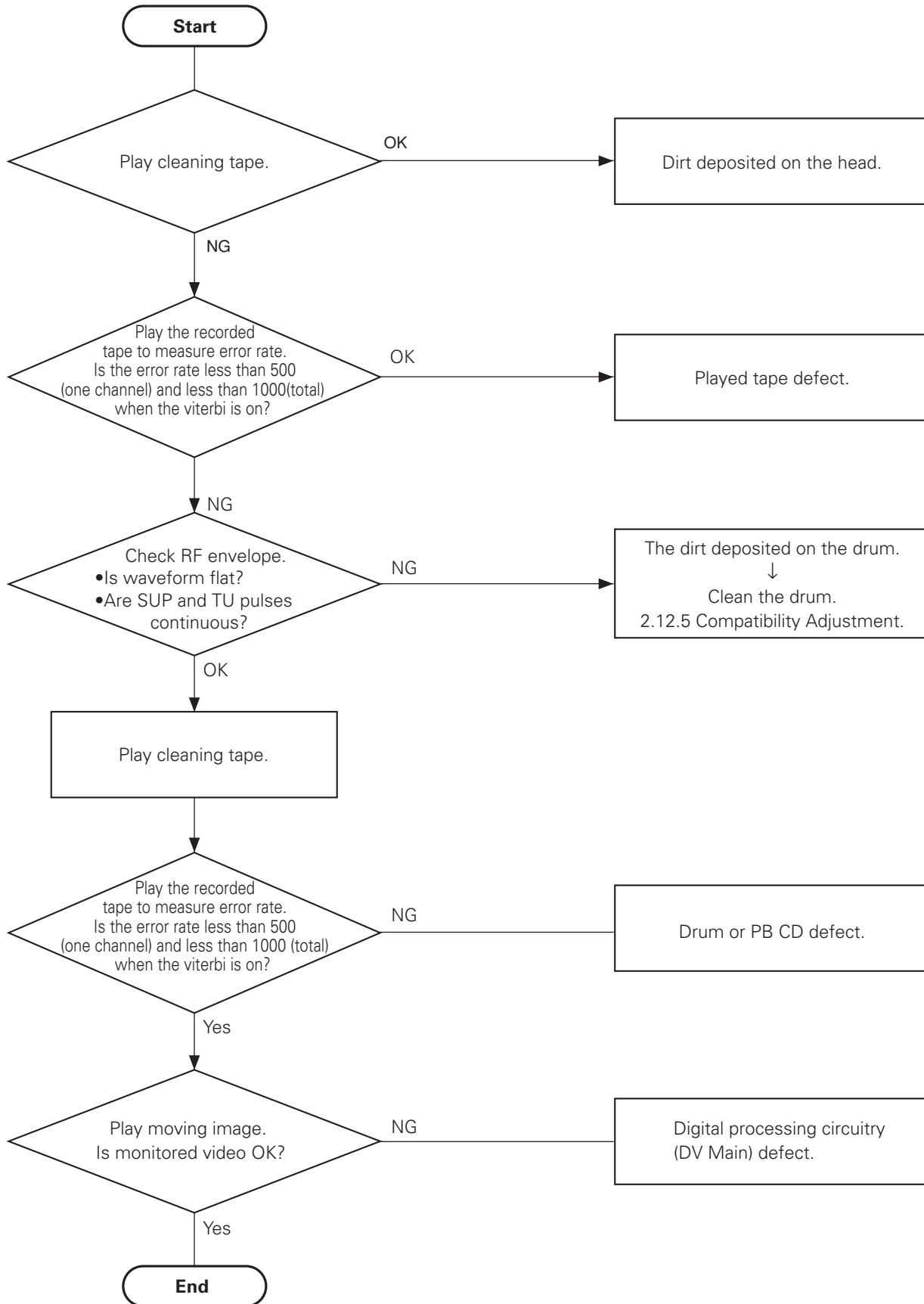
7305 NO TU REEL ROTATION DURING UNLOADING

- VCR operation : The AUTO OFF mode is initiated.
- Cause : Malfunction of the cassette housing switch or cassette housing motor.
- Detection method : When the TU reel rotation detected (at pin 59 of IC401) during unloading is less than 1/2 turn.

1.17 ANALYSIS OF BLOCK NOISE (SYMPTOMS: POOR VIDEO, ABSENCE OF AUDIO)

1.17.1 Analysis Flow Chart

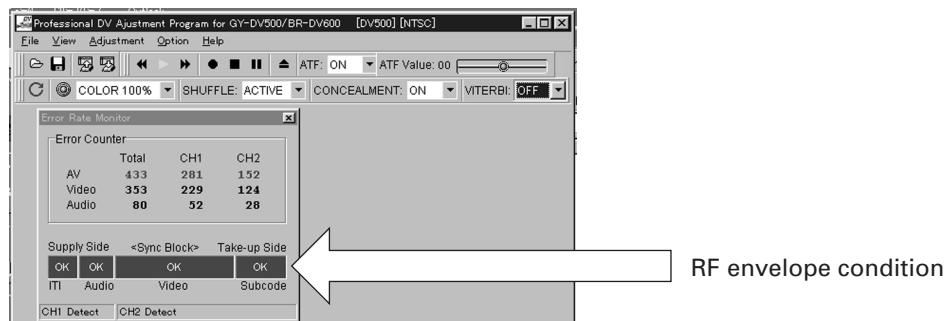
In case of trouble, perform troubleshooting using the following flow chart.



1.17.2 RF Envelope Check

Symptom Observed on Monitor Screen	RF envelope	Audio, etc.	Possible Causes
Block noise on left	SUP dropout	<ul style="list-style-type: none"> No audio output. Intermittent audio. 	<ul style="list-style-type: none"> Supply guide roller adjustment failure. Dirt on supply side of drum.
Block noise on right	TU dropout	<ul style="list-style-type: none"> Timecode not counted. 	<ul style="list-style-type: none"> Take-up guide roller adjustment failure. Dirt on take-up side of drum.
One CH frozen	No video output from one CH	<ul style="list-style-type: none"> Audio is output. 	<ul style="list-style-type: none"> Dirt attached on one CH of head. Drum assembly defective. PR & MDA board IC901 defective.
Frozen	Low level	<ul style="list-style-type: none"> No audio output. 	<ul style="list-style-type: none"> Dirt attached on head. Drum assembly defective.

The RF envelope condition can be confirmed to a certain degree in the Error Rate adjustment display.



SECTION 2

MECHANICAL ADJUSTMENTS

2.1 BEFORE ADJUSTMENTS

2.1.1 Precautions

- 1) Be sure to apply a screw securing torque when attaching a part.
The securing torque should be 0.04 N·m (0.4 kgf·cm) unless otherwise specified.
- 2) Always unplug the power cord of the set before attaching, removing or soldering a part.
- 3) When unplugging a connector, do not pull the wire but grasp the connector body.
- 4) Do not make an adjustment or rotate a potentiometer blindly while the source of trouble is not identified.
- 5) Before adjusting electrical circuitry, be sure to wait for more than 10 minutes after turning the power on.

2.1.3 Equipment required for adjustments

1	DV 12 V power supply(AA-G10/AA-P250) Output capability of 3 A or more.	7	Slit washer attaching tool YTU94121A
2	Alignment tape MC-1 (NTSC) MC-2 (PAL)	8	Connector cable PTU94018A
3	DV tape For use in self-recording/playback. (60 ME)	9	PC cable QAM0099-001
4	Cassette torque meter YTU94150A	10	Adjustment software PLSC1304
5	Guide screwdriver YTU94085	11	Chip IC replacement tool PTS40844-2
6	Torque screwdriver YTU94088		Replaceable bit (long type)

Table 2-1-2

2.2 BASICS OF MECHANISM DISASSEMBLY/ASSEMBLY

2.2.1 Assembly mode

The disassembly and assembly of the mechanism can be done in the ASSEMBLY mode (see Table 2-2-1).

The ASSEMBLY mode is provided in the intermediate position between C-IN and S.FF. As the C-IN (Cassette IN) mode is usually set when a cassette tape is ejected, the ASSEMBLY mode should be entered after entering the C-IN mode. To set the AS-

SEMBLY mode, apply 3 V DC to the electrodes at the top of the loading motor shown in Fig. 2-2-1. The ASSEMBLY mode is set when the markings (red) on two gear teeth of the rotary encoder are aligned with the confirmation holes.

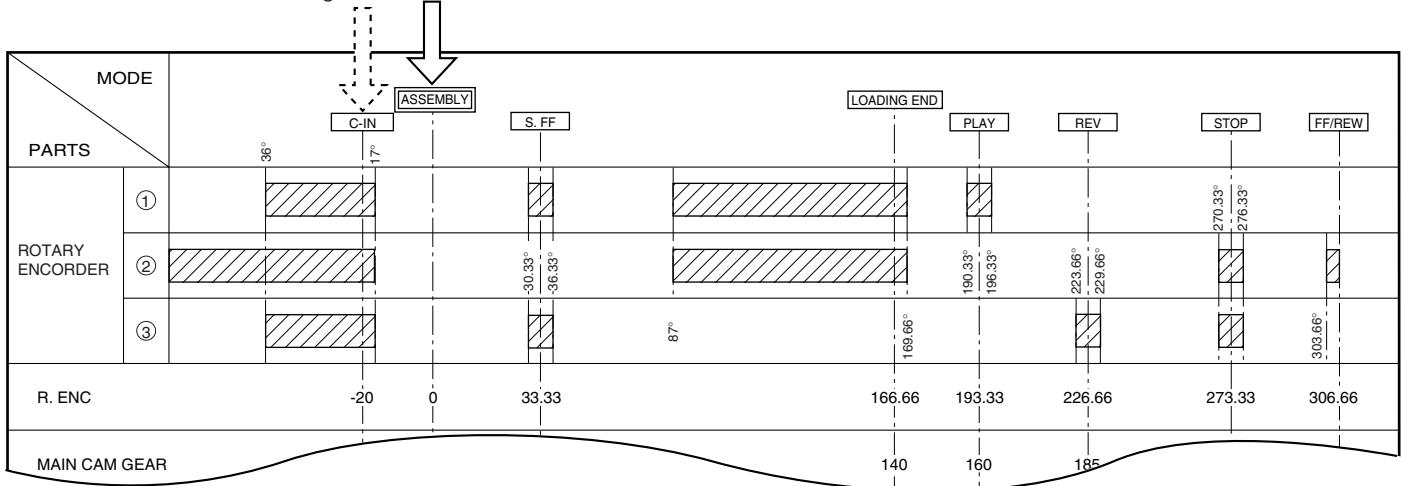


Table 2-2-1

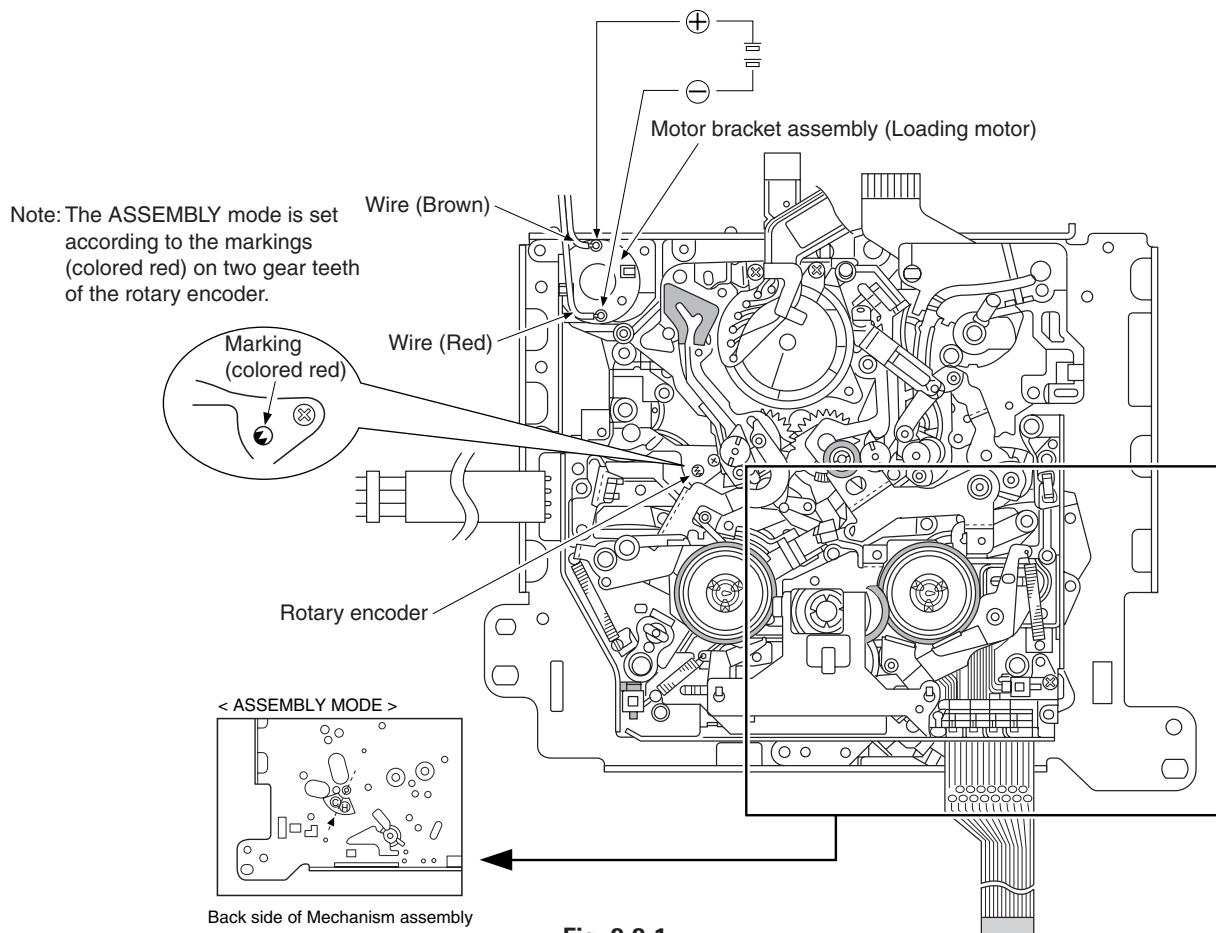


Fig. 2-2-1

2.2.2 Mechanism modes

The mechanism has 6 modes as shown in Table 2-3-1.
The current mode can be confirmed by observing the markings on the sub-cam gear and the ▲ mark on the main deck at the back side of mechanism assembly. See Figs. 2-2-2 to -7.

1. Mechanism mode confirmation

<C-IN : (C)>

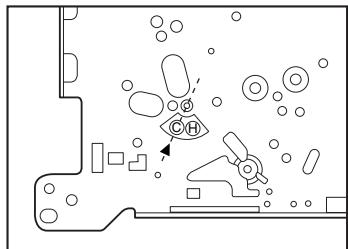


Fig. 2-2-2

<S-FF : (H)>

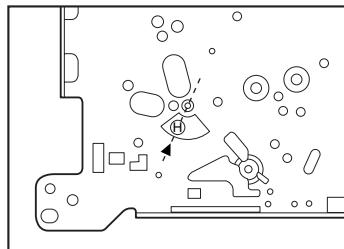


Fig. 2-2-3

<PLAY : (P)>

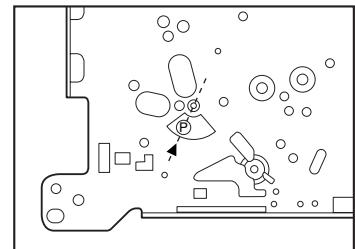


Fig. 2-2-4

<REV : (R)>

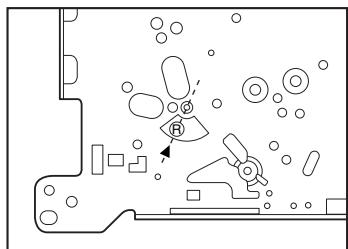


Fig. 2-2-5

<STOP : (S)>

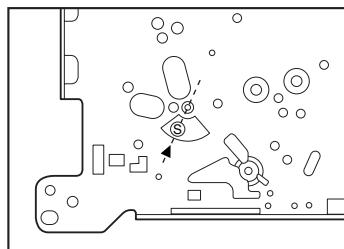


Fig. 2-2-6

<FF/REW : (F)>

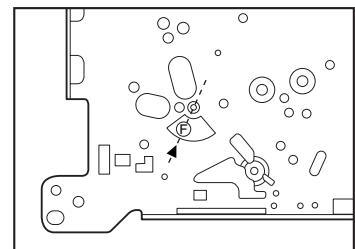


Fig. 2-2-7

2.3 MECHANISM TIMING CHART

See following table (Table 2-3-1).

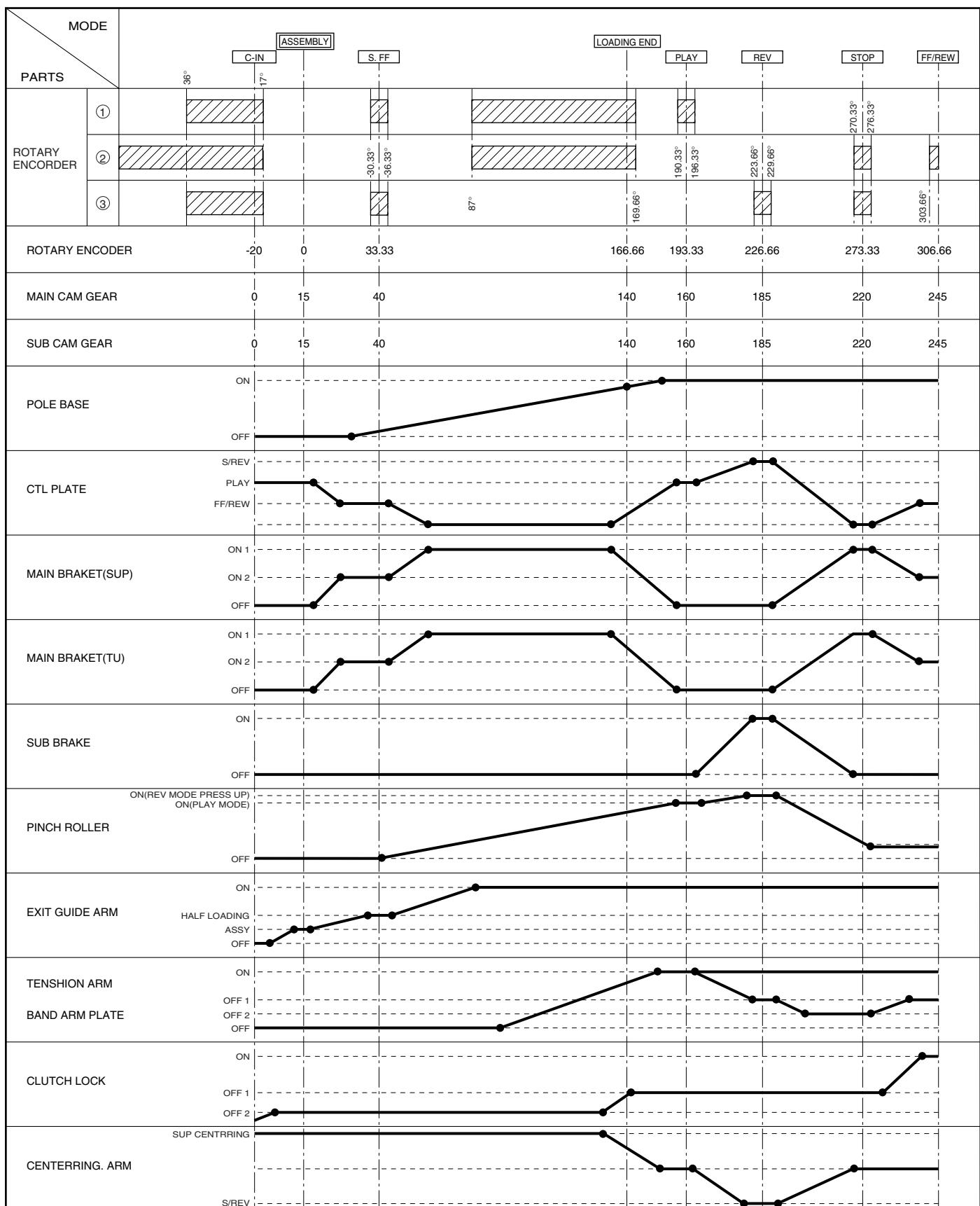


Table 2-3-1

2.4 MAINTENANCE AND INSPECTION OF MAJOR PARTS

Periodical inspection and maintenance are requisite to maintain the initial performance and reliability of the product. Table 2-4-1 (Maintenance & Inspection List) has been compiled assuming standard operating conditions, and the specifications in the table are greatly variable depending on the actual operating environment and conditions. Remember that, if the maintenance and inspection are not enforced properly, the operating hours of

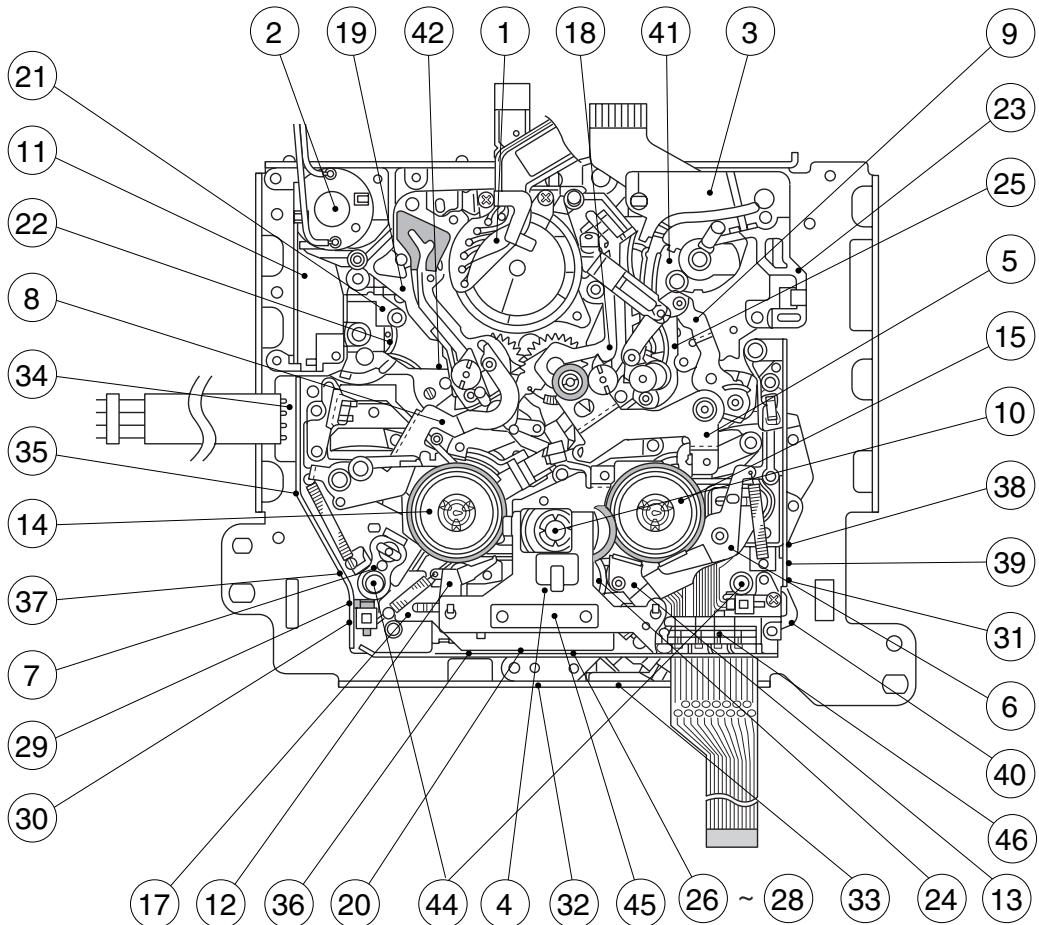
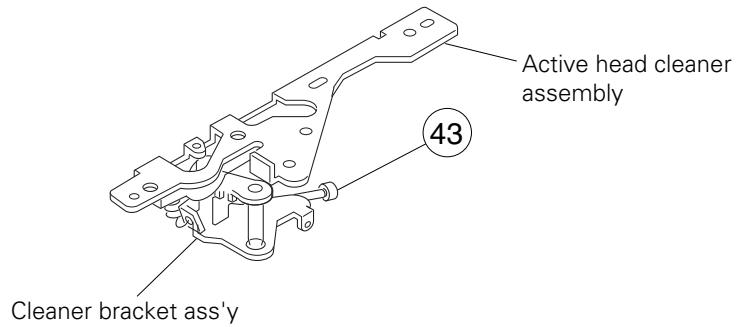
the product will not only reduce considerably but other unfavorable influences may produce.

Rubber parts may deform or degrade after long period of storage even if they are not used in this period.

The service life of the drum is variable depending on the tape used and operating environment.

2.4.1 Layout of Major Parts

To attach the Active Head Cleaner Assembly, refer to "1.7.2. Disassembling the Rear Part of the Unit".



2.4.2 Maintenance and inspection list

- 1) The 6000 H maintenance consists of a replacement of the entire mechanism assembly.
- 2) When mounting the capstan motor on the main deck, control of the verticality is required. Therefore, when the capstan motor reaches the end of its service life, the entire mechanism assembly should be replaced.

	Part Name	Symbol No.	Operating Hours (DRUM Hour Meter)												Ref.	
			500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000		
1	Tape transport parts		★	★	★	★	★	★	★	★	★	★	★	★	—	
2	②1 ENT. guide base assembly	M 6 43	★	○★	★	●	★	○★	★	●	★	○★	★	—	2.7.14	
3	⑧ Tension arm sub-assembly	M 6 40	★	○★	★	●	★	○★	★	●	★	○★	★	—	2.7.8	
4	⑯ Guide rail (S) assembly	M 6 22	★	○★	★	●	★	○★	★	●	★	○★	★	—	2.7.12	
5	⑮ Guide rail (T) assembly	M 6 23	★	○★	★	●	★	○★	★	●	★	○★	★	—	2.7.12	
6	③ Middle catcher assembly	M 6 24	★	○★	★	●	★	○★	★	●	★	○★	★	—	2.7.5	
7	⑦ Capstan shaft	M 6 4	★	★	★	★	★	★	★	★	★	★	★	★	—	
8	⑤ Pin roller arm assembly	M 6 44	★	○★	★	●	★	○★	★	●	★	○★	★	—	2.7.3	
9	⑨ Exit guide arm assembly	M 6 43	★	○★	★	●	★	○★	★	●	★	○★	★	—	2.7.4	
10	① Drum assembly	M 6 50	★	★	★	●	★	★	★	●	★	★	★	—	2.7.2	
11	④1 Capstan motor	M 6 4	—	—	—	—	—	○	○	○	○	○	○	●	—	
12	⑤5 Reel drive pulley assembly	M 6 33	—	○Δ	—	●Δ	—	○Δ	—	●Δ	—	○Δ	—	—	2.7.15	
13	④4 Center gear assembly	M 6 34	○	●Δ	○	●Δ	○	●Δ	○	●Δ	○	●Δ	○	●Δ	—	2.7.14
14	②3 Timing belt	M 6 11	○	●	○	●	○	●	○	●	○	●	○	●	—	2.7.14
15	②8 Clutch lock gear (1) ②7 Clutch lock gear (2)	M 6 12 M 6 14	—	○Δ	—	●Δ	—	○Δ	—	●Δ	—	○Δ	—	—	2.7.15	
16	⑥ Sub-brake assembly	M 6 36	—	○	—	●	—	○	—	●	—	○	—	—	2.7.10	
17	⑫ Main brake (S) assembly	M 6 38	—	○	—	○	—	○	—	○	—	○	—	—	2.7.10	
18	⑬ Main brake (T) assembly	M 6 37	—	○	—	●	—	○	—	●	—	○	—	—	2.7.10	
19	⑭ 15Reel disk assemblies	M 6 39	—	○	—	●Δ	—	○	—	●Δ	—	○	—	—	2.7.11	
20	⑦ Band arm plate assembly	M 6 41	—	○	—	●	—	○	—	●	—	○	—	—	2.7.8	
21	⑩ Swing arm assembly	M 6 42	○	●	○	●	○	●	○	●	○	●	○	●	—	2.7.7
22	②2 Worm wheel 2	M 6 3	—	○	—	●	—	○	—	●	—	○	—	—	2.7.14	
23	② Motor bracket assembly	M 6 20	—	○	—	●	—	○	—	●	—	○	—	—	2.7.2	
24	④4 Rotary encoder assembly	M 6 21	—	○	—	●	—	○	—	●	—	○	—	—	2.7.18	
25	③7 Centering arm assembly	M 6 26	—	○	—	●	—	○	—	●	—	○	—	—	2.7.18	
26	③5 Min cam	M 6 8	—	○	—	●	—	○	—	●	—	○	—	—	2.7.18	
27	③8 Sub cam	M 6 9	—	○	—	●	—	○	—	●	—	○	—	—	2.7.19	
28	④3 Cleaner assembly	M 5 29	○	●	○	●	○	●	○	●	○	●	○	●	—	2.7.20
29	④4 Cassette guide pin	M 6 35	★	★	★	★	★	★	★	★	★	★	★	★	—	
30	④5 Cassette guide	M 6 35	★	★	★	★	★	★	★	★	★	★	★	★	—	
31	④6 MIC contact	M 6 35	★	★	★	★	★	★	★	★	★	★	★	★	—	
32	Mechanism assembly (including cassette housing assembly)	M 6 1	—	—	—	—	—	—	—	—	—	—	—	●	—	

★: Clean with ethanol. ○: Check and replace if required. ●: Replace. Δ: Oil the shaft.
After replacing a part, apply lubricant to the required points.

Table 2-4-1

2.4.3 Cleaning

The tape transport system should be cleaned periodically. Be sure to clean the tape transport system upon receipt of a set for servicing, etc. To clean use a good quality fine-textured cloth moistened with ethyl alcohol.

- 1) When the video head is stained, the playback output decreases and a read error will not be able to be corrected by the error correction. If this occurs, the video will be interfered by block noise, the audio will not be output, and the video output will eventually be lost when the video head becomes extremely dirty. To clean the drum, while applying cleaning cloth (service part No. : KSMM-01) or high quality paper gently to the upper drum, rotate the upper drum in the normal (counterclockwise) rotation direction.

The dirt deposited on the video head can be removed by playing a cleaning tape.

CAUTION

Do not move the cleaning paper while applying it to the video head. Otherwise, the video head may be damaged.

- 2) The lower drum tends to attract dirt on the leader section and the linearity cannot be guaranteed when the lower drum becomes extremely dirty. Particularly, the tape inlet and output sections gather dirt easily, causing symptoms such as dropout of the reproduced FM signal, deterioration of video quality and lack of audio output. In order to clean the leader section, rub a a cotton swab gently along its edge.
- 3) Stain of the tape transport system leads to tape damage. When magnetic powder or dirt penetrates inside the rollers, a rotation malfunction may affect the video. Clean the tape transport parts carefully using a cleaning cloth or cotton swab moistened with ethyl alcohol.

2.4.4 Oiling and Greasing

Table 2-4-2 shows the oil and greases used with the set.

Classification	Name	Part No.
Oil	Cosmo Hydro HV100	YTU94027
Grease	Maltemp SH-P	KYODO-SH-P
	Hanal	RX-410R

Table 2-4-2

- 1) Oiling should be performed periodically. Oil the shafts by referring to the maintenance table.
- 2) After replacing a part, grease the required points. For the parts to be greased see the exploded diagram in chapter 5, "DISASSEMBLY DRAWINGS AND PARTS LIST".
- 3) As Hanal separates over time, be sure to mix it (shake) well before use.
- 4) Take care not to leave grease or oil on the tape transport parts which come into contact with the tape or on the brake pads.
- 5) Take care not to apply too much oil or grease. The standard oiling quantity is one drop and the standard greasing quantity is the quantity with which the grease does not overflow.

2.5 PERIODICAL MAINTENANCE

Perform maintenance at the correct times in accordance with the maintenance table.

Fig. 2-5-1 shows the flow chart of periodical maintenance procedures at different operating hours.

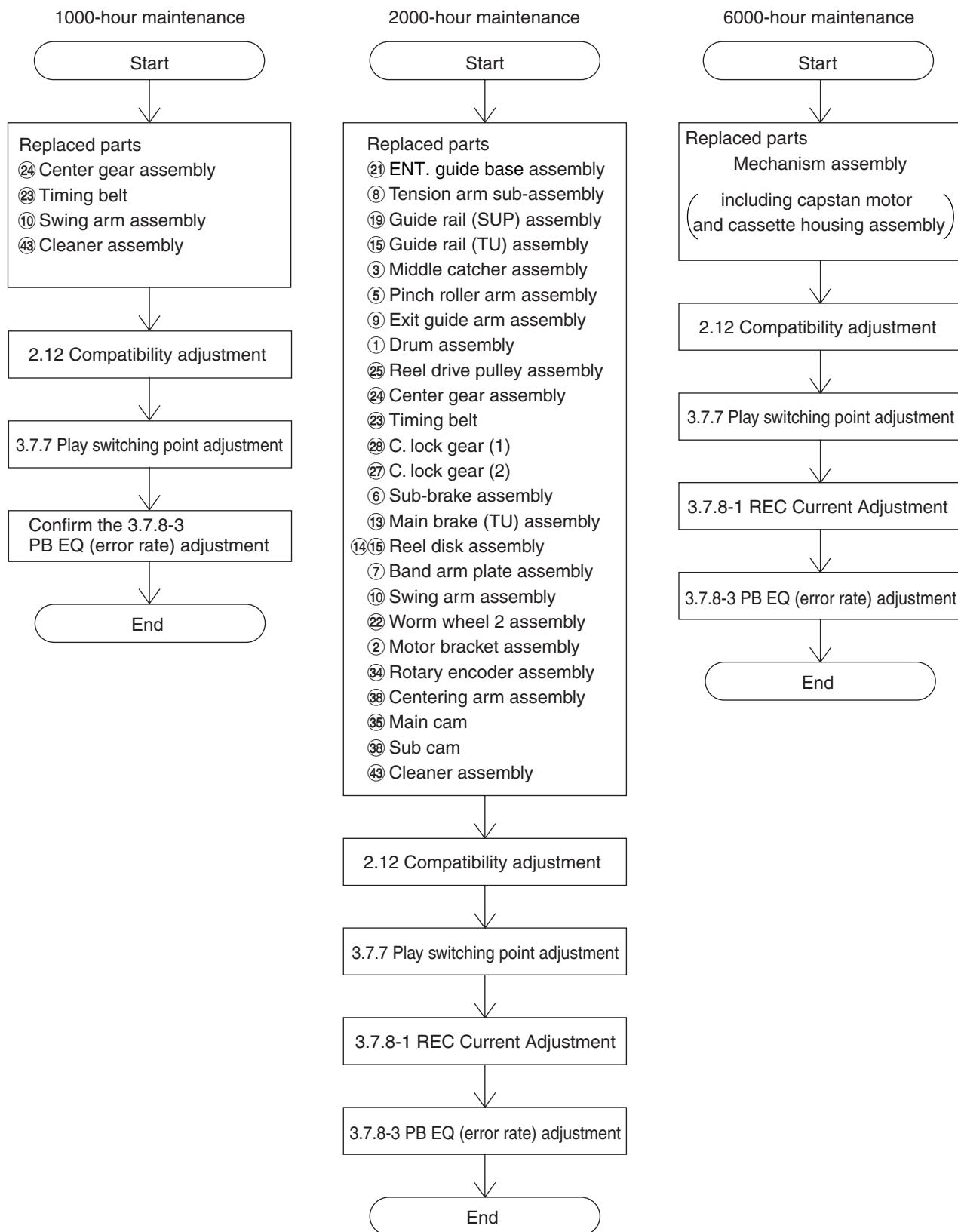


Fig. 2-5-1

2.6 DISASSEMBLY/ASSEMBLY OF MECHANISM ASSEMBLY

2.6.1 Assembly/Disassembly

The following table shows the mechanism assembly/disassembly procedures.

- ① : Names of the disassembled/assembled parts.
- ② : Items of disassembly.
- ③ : Parts to be removed for disassembly, such as screws, washers and springs, and points.

Symbol	Name or Point
S	Screw
W	Washer
P	Spring
*	Connector, lock (L), soldering (SD), shield, etc.

2.6.2 Screws and Washers Used in Mechanism Assembly Disassembly/Assembly

Table 2-6-1 shows the symbols, designs, part numbers and colors of the screws and washers used with the Mechanism assembly.

When disassembling or assembling the Mechanism assembly, be sure to attach the correct screws and washers by referring to the following table.

Symbol	Design	Part No.	Color
(S1)		QYSDSP2005Z	Gold
(S2)		YQ43893	Silver
(S3)		YQ43893-7	Black

Symbol	Design	Part No.	Color
W1		YQ44246	Red
W2		YQ44246-3	Black
W3		YQ43933-2	Black

Fig. 2-6-1

	Part Name	Step	Points	Remark
1	Ⓐ Cassette housing assembly, Ⓑ Main deck assembly	1	2(S1), (L1) to (L5)	
2	① Drum assembly	2	3(S2)	
3	② Motor bracket assembly	2	4(S2)	
4	③ Middle catcher assembly	3	3(S2)	

↑
①

↑
②

↑
③

2.6.3 Mechanism Assembly Disassembly Procedure Table

	Part Name	Item	Points	Remark
1	Ⓐ Cassette housing assembly	1	2 (S1), (L1) to (L5)	
2	① Drum assembly	2	3 (S2)	
3	② Motor bracket assembly	2	4 (S2)	
4	③ Middle catcher assembly	5	3 (S2)	
5	④ Reel cover assembly	6	(S2), 2 (L6)	
6	⑤ Pinch roller arm assembly	3	(W1), (L7)	
7	⑥ Sub-brake assembly	10	(P1), (W1), (L8)	
8	⑦ Band arm plate assembly	8	(S3), (L9), (P2), (W2)	
9	⑧ Tension arm sub-assembly	8	(P3)	
10	⑨ Exit guide arm assembly	4	(W1)	
11	⑩ Swing arm assembly	7	–	Position alignment
12	⑪ Sub-deck assembly	9	4 (S2)	Position alignment
13	⑫ Main brake (SUP) assembly	10	(P4), (L10)	
14	⑬ Main brake (TU) assembly	10	(P5), (L11)	
15	⑭ Reel base assembly (SUP)	11	–	
16	⑮ Reel base assembly (TU)	11	–	
17	⑯ Prism	7	(S2)	
18	⑰ Control plate	11	(2 (L12)	
19	⑱ Guide rail (TU) assembly	12	4 (S2)	Position alignment
20	⑲ Guide rail (SUP) assembly	12	(S2), 2 (L13)	Position alignment
21	⑳ Base plate assembly	13	(S2), 2 (L14)	
22	㉑ ENT. guide base assembly	14	(S2)	
23	㉒ Worm wheel 2	14	–	Phase alignment
24	㉓ Timing belt	14	–	
25	㉔ Center gear assembly	14	–	
26	㉕ Reel drive pulley assembly	15	(W1)	
27	㉖ Push plate	15	(W1)	
28	㉗ Clutch lock gear (2)	15	(W3)	
29	㉘ Clutch lock gear (1)	15	(P6)	
30	㉙ Tension control arm assembly	16	(L15)	Position alignment
31	㉚ Brake control arm assembly	16	(W1), (L16)	Position alignment
32	㉛ Charge arm assembly	16	(L17)	Position alignment
33	㉜ Connect gear 2 (SUP)	17	(S2)	(Phase alignment)
34	㉝ Connect gear 2 (TU)	17	(S2)	(Phase alignment)
35	㉞ Rotary encoder assembly	18	2 (S2)	Phase alignment
36	㉟ Main cam	18	(W1)	Phase alignment
37	㉟ Arm gear 1 assembly	18	Collar	Position alignment
38	㉞ Centering arm assembly	18	(L18)	Position alignment
39	㉟ Sub cam	19	(S2)	Phase alignment
40	㉟ Arm gear 2 assembly	19	–	Position alignment
41	㉟ Clutch lock lever assembly	19	(L19)	Position alignment
42	㉟ Capstan motor			Change with mechanism assembly
43	㉟ Drum base deck		3 (S2)	

Table 2-6-2

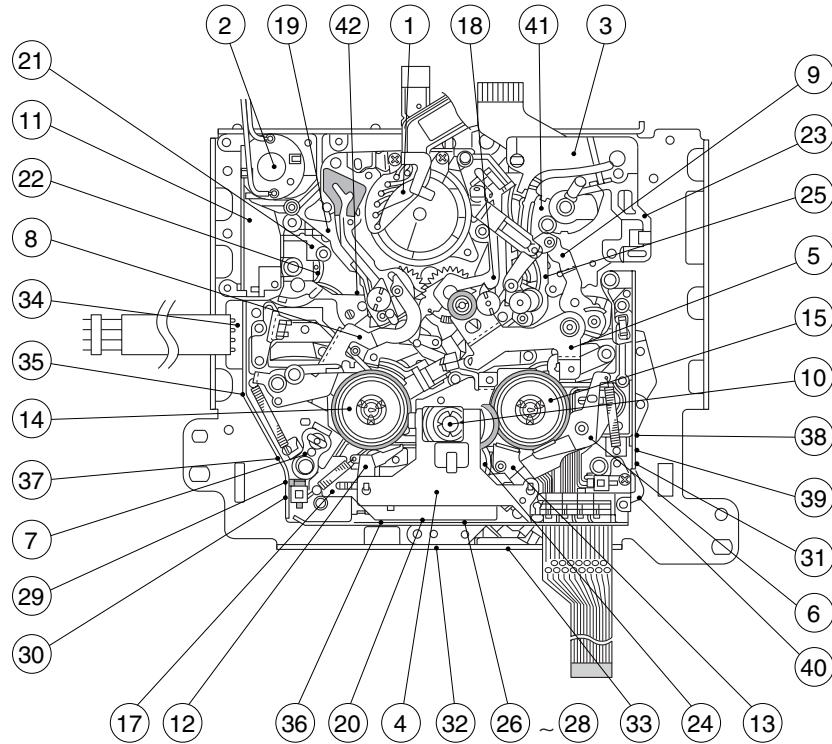


Fig. 2-6-1

2.6.4 Mechanism disassembly/assembly procedure chart

<How to read the chart>

- The following chart shows the disassembly/assembly procedures by dividing them into blocks A to I.
- To remove the tension arm sub-assembly which is located in block D; start disassembly from block A. The tension arm sub-assembly can be removed as the fourth operation after the removals of the cassette housing assembly (block A) → reel cover assembly (block B) → band arm plate assembly (block C).
- The parts enclosed in thick frames are the maintenance parts listed in the maintenance table.
- For details on the disassembly/assembly, see section 2.7, "Replacement of Major Parts".

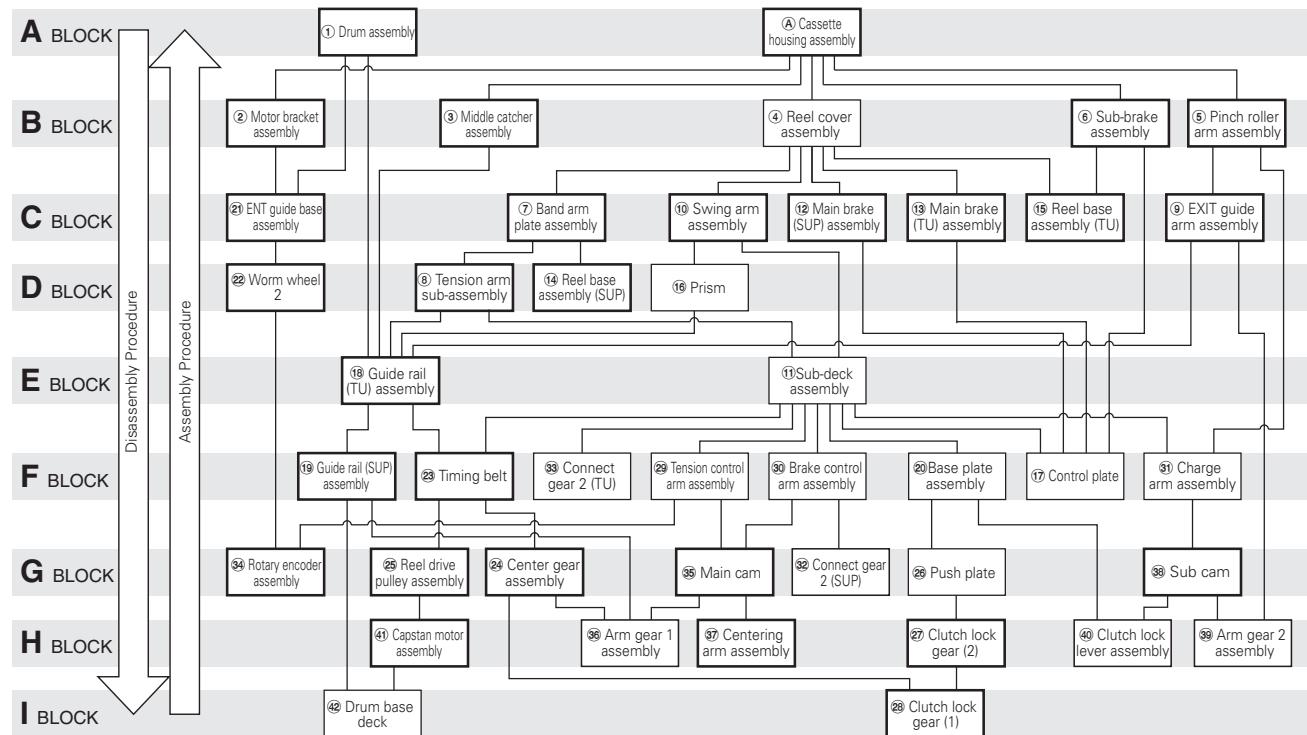
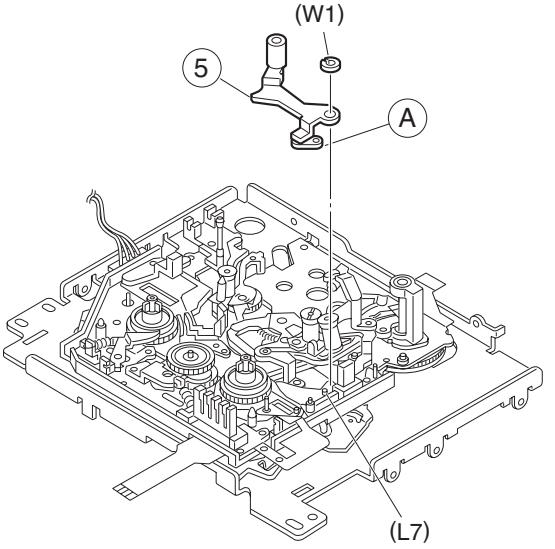
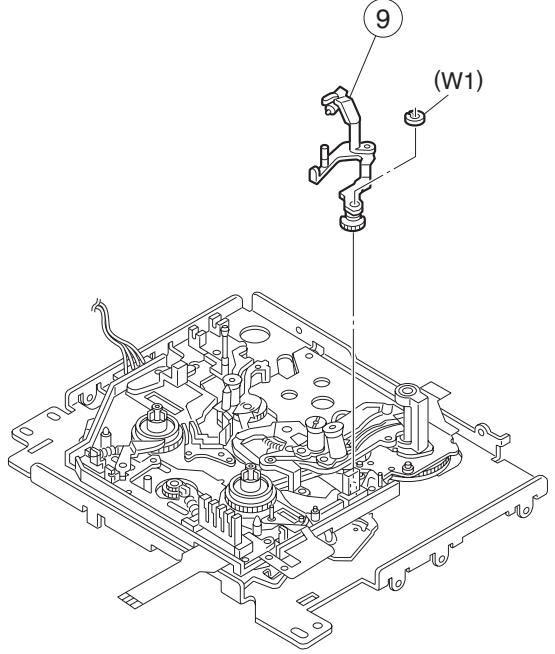
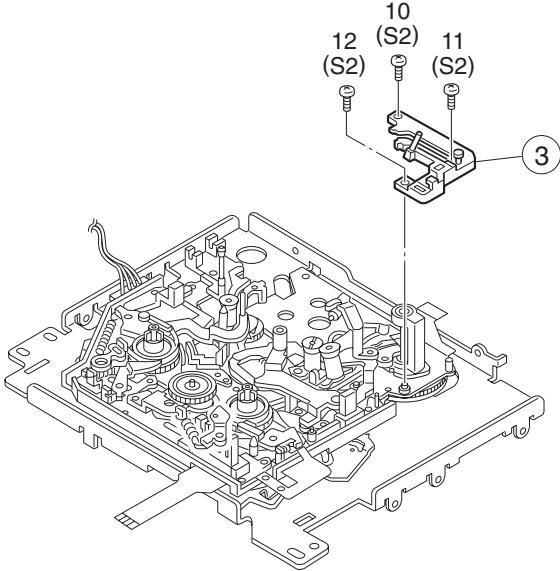
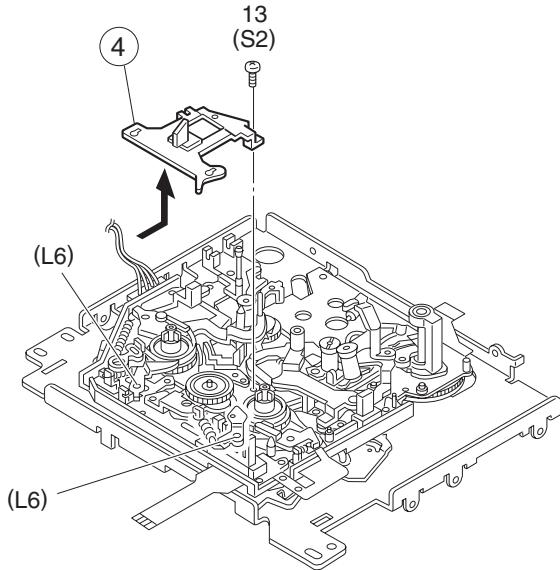


Fig. 2-6-2

No.	Item	Reference picture/drawing	Procedure
2.7 REPLACEMENT OF MAJOR PARTS			
<ul style="list-style-type: none"> Make sure that the mechanism is in the ASSEMBLY mode before proceeding to disassembly or assembly. (See section 2.1, "Assembly Mode".) Screws must always be tightened using a torque screwdriver and at the specified torque. 			
1	Ⓐ Cassette housing assembly		<p><Removal></p> <p>1) Remove the 2 screws (S1) then take out the cassette housing by sliding it upward and toward the front.</p> <p><Attaching></p> <p>1) Reverse the removal procedure.</p>
2	① Drum assembly, ② Motor bracket assembly		<p><Removal></p> <p>① Drum assembly 1) Remove the 3 screws (S2) and take out the assembly.</p> <p>② Motor bracket assembly 1) Remove the 4 screws and take out the motor bracket assembly.</p> <p><Attaching></p> <p>1) Reverse the removal procedure</p>

No.	Item	Reference picture/drawing	Procedure
3	⑤ Pinch roller arm assembly	<p><Removal></p> <p>1) Remove the washer (W1) and pull out the assembly.</p> <p><Attaching></p> <p>1) Fit the pinch roller arm assembly A into the boss (L7) of the charge arm assembly. 2) Attach the washer (W1).</p>  <p>Fig. 2-7-3</p>	
4	⑨ Exit guide arm assembly	<p><Removal></p> <p>1) Remove the washer (W1) and pull out the assembly.</p> <p><Attaching></p> <p>1) Reverse the removal procedure.</p>  <p>Fig. 2-7-4</p>	

No.	Item	Reference picture/drawing	Procedure
5	③ Middle catcher assembly	<p>Fig. 2-7-5</p> 	<p><Removal></p> <p>1) Remove the 3 screws (S2) and remove the assembly.</p> <p><Attaching></p> <p>1) Reverse the removal procedure.</p>
6	④ Reel cover assembly	<p>Fig. 2-7-6</p> 	<p><Removal></p> <p>1) Remove the screw (S2). 2) Slide the assembly toward the drum and lift the assembly up to remove it.</p> <p>NOTE</p> <ul style="list-style-type: none"> After having removed the reel cover, take care because the parts located below the reel cover tend to slip out easily. <p><Attaching></p> <p>1) Insert the reel cover into (L6) and attach by reversing the removal procedure.</p>

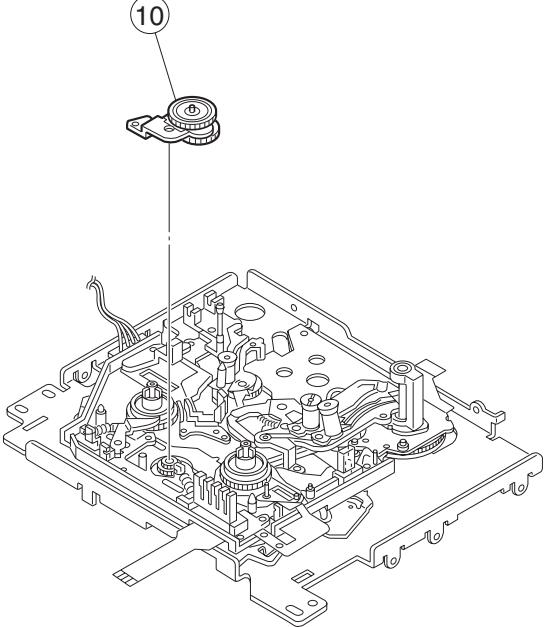
No.	Item	Reference picture/drawing	Procedure
7	⑩ Swing arm assembly	<p><Removal></p> <p>1) Pull the assembly upward.</p>  <p><Attaching></p> <p>1) Reverse the removal procedure.</p>	

Fig. 2-7-7

No.	Item	Reference picture/drawing	Procedure
8	⑦ Band arm plate assembly, ⑧ Tension arm sub-assembly	<p>Fig. 2-7-8(a)</p> <p>Attaching the spring</p> <p>Step 1 Hook (a) (Longer end)</p> <p>Step 2 Hook (b) (Shorter end)</p> <p>Step 3</p>	<p><Removal></p> <ol style="list-style-type: none"> 1) Remove the washer (W2). 2) Remove the screw (S3). 3) Remove the spring (P2). 4) Remove the band arm plate assembly and tension arm sub-assembly. <p>NOTE Be careful not to lose the spring (P3).</p> <p><Attaching></p> <ol style="list-style-type: none"> 1) Attach the spring (P3) to the tension arm sub-assembly. Engage the longer end of spring to hook (a) and the shorter end to hook (b) as shown in Fig. 2-7-8(b). 2) Attach the tension arm sub-assembly. 3) Attach the band arm plate assembly. 4) Clamp with the screw (S3) and washer (W2). 5) Attach the spring (P2) to (L9). <p>NOTE After attaching, ensure that the band arm assembly can rotate in the direction of the arrow as shown in Fig. 2-7-8(c).</p> <p>Fig. 2-7-8(c)</p> <p>6) After attaching, adjust the tension.</p>

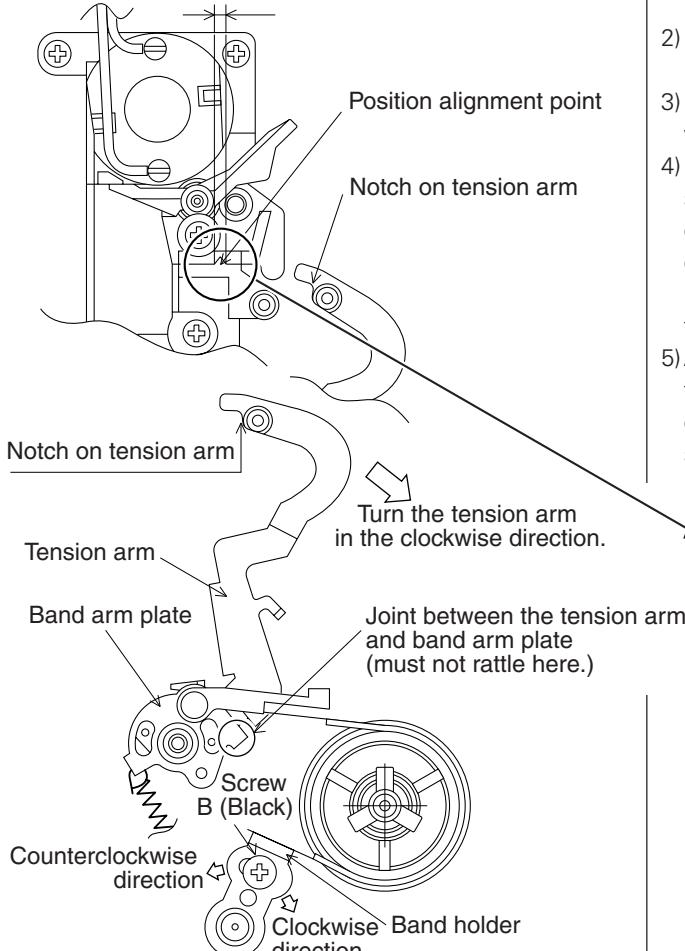
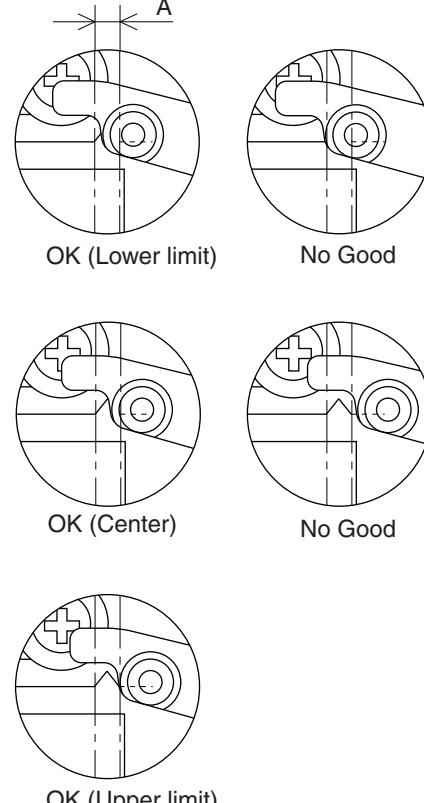
No.	Item	Reference picture/drawing	Procedure
8	<Tension arm sub-assembly position adjustment>		<p>1) Without loading a tape, set the mechanism mode to PLAY mode. To switch the mode, rotate worm wheel 2 while the motor bracket assembly is disengaged (see 2.2, "Mechanism Modes").</p> <p>2) Rotate the tension arm slightly clockwise to eliminate production of rattle with the band arm plate.</p> <p>3) Ensure that the notch on the tension arm is located within area A. (See Fig. 2-7-8(e).)</p> <p>4) If the tension arm is not located in area A, loosen screw B (black) lightly and fine-adjust the position of the band arm plate assembly. Turn the screw counterclockwise to move the tension arm extremity toward the right or clockwise to move it toward the left.</p> <p>5) After the adjustment, clamp the band holder by tightening screw B (black) (with a securing torque of 5.88 Nm, or 0.6 kgf-cm). Then adjust the tension arm position again.</p>  <p>OK (Lower limit) No Good</p> <p>OK (Center) No Good</p> <p>OK (Upper limit)</p>

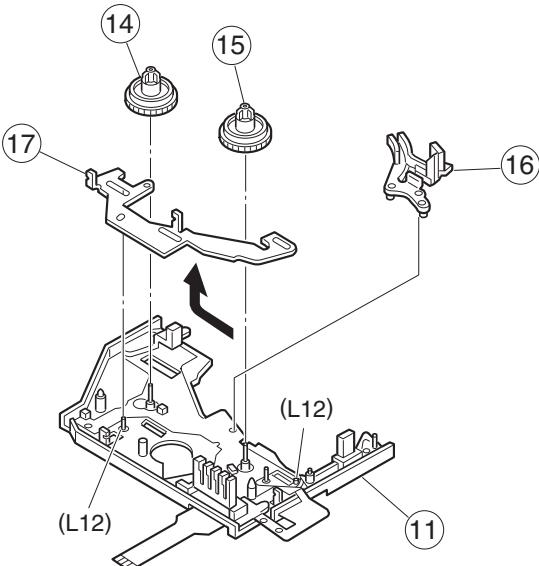
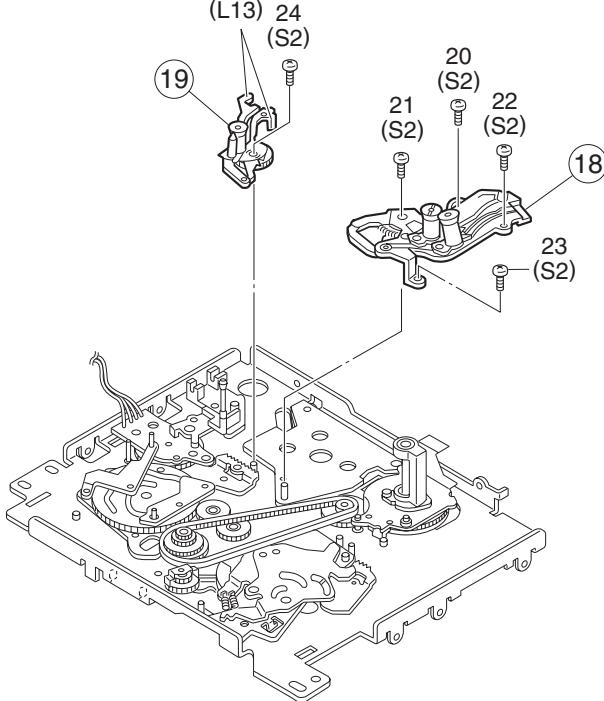
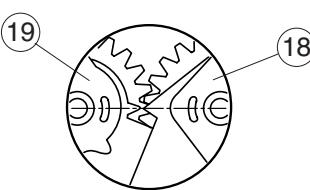
Fig. 2-7-8(d)

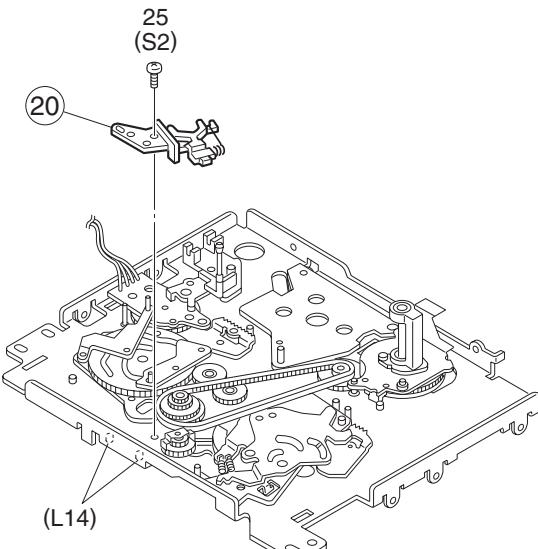
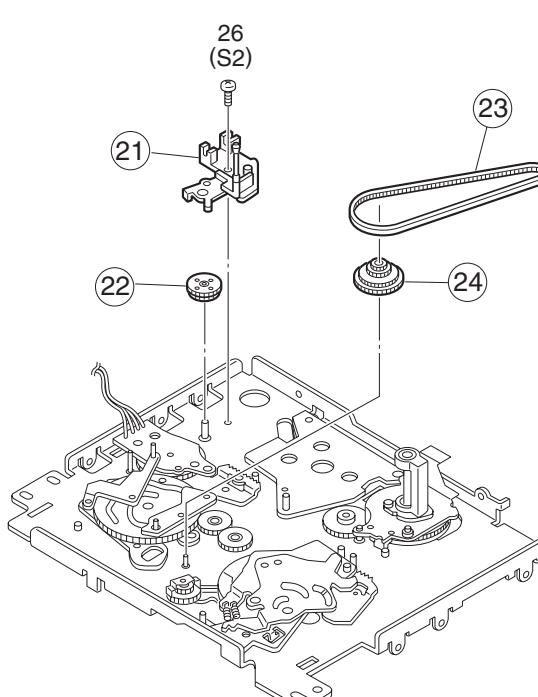
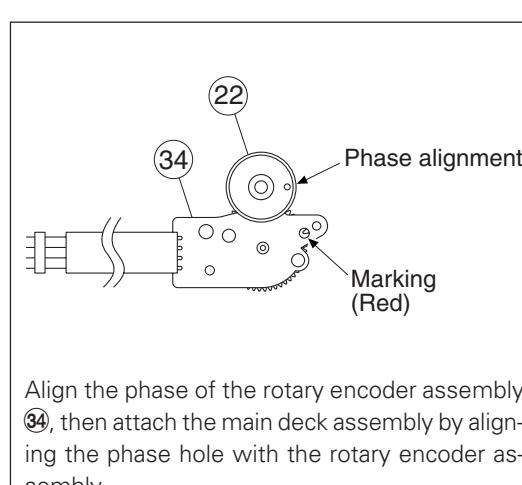
Fig. 2-7-8(e)

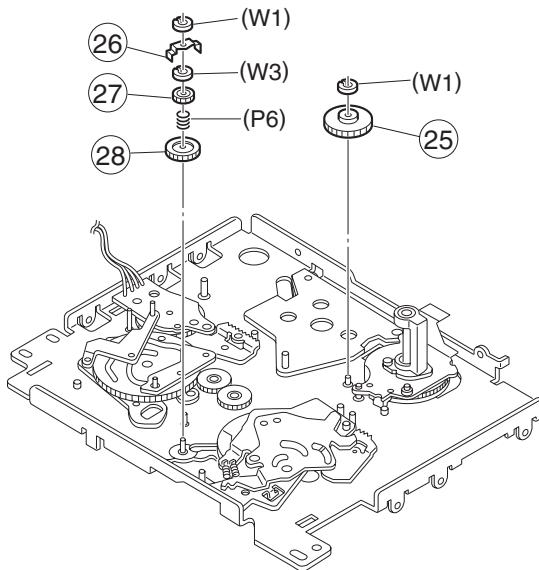
No.	Item	Reference picture/drawing	Procedure
9	⑪ Sub-deck assembly	<p>The diagram shows the Sub-deck assembly (11) with its internal components. Labels include 15 (S2), 16 (S2), 17 (S2), 18 (S2), Phase alignment, Control plate (L11), and a note: 'The boss should fit into the hole.'</p>	<p><Removal></p> <p>1) Remove the 4 screws (S2) and pull out the assembly.</p> <p><Attaching></p> <p>1) While sliding the control plate toward the left, attach the sub-deck assembly.</p> <p>NOTE</p> <ul style="list-style-type: none"> Attach by aligning the phase holes of the main deck assembly and control plate. <p>2) Clamp with 4 screws (S2).</p>
10	⑫ Main brake (SUP) assembly, ⑬ Main brake (TU) assembly, ⑯ Sub-brake assembly	<p>The diagram shows the Main brake (SUP) assembly (12), Main brake (TU) assembly (13), and Sub-brake assembly (6) with their respective part numbers (P4, P5, W1, P1, L10, L11, L8) and labels.</p>	<p><Removal></p> <p>Main brake (SUP) (TU) assembly</p> <p>1) Remove the spring by disengaging its ends from the hooks (L10) (L11).</p> <p>Sub-brake assembly</p> <p>1) Remove the washer (W1). 2) Remove the spring by disengaging it from the hook (L8).</p> <p><Attaching></p> <p>1) Reverse the removal procedure.</p>

Fig. 2-7-9

Fig. 2-7-10

No.	Item	Reference picture/drawing	Procedure
11	⑭ Reel base (SUP) assembly, ⑮ Reel base (TU) assembly, ⑯ Control plate, ⑯ Prism	<p>⑭ Reel base (SUP) assembly, ⑮ Reel base (TU) assembly, ⑯ Control plate, ⑯ Prism</p>  <p>Fig. 2-7-11</p>	<p><Removal></p> <ol style="list-style-type: none"> 1) Pull up each assembly to remove it. The control plate can be removed by sliding it toward the left as shown by the arrow. 2) Remove the screw (S2) to remove the prism. <p><Attaching></p> <ol style="list-style-type: none"> 1) Reverse the removal procedure.
12	⑯ Guide rail (TU) assembly, ⑯ Guide rail (SUP) assembly	 <p>Fig. 2-7-12(a)</p>	<p><Removal></p> <p>Guide rail (TU) assembly:</p> <ol style="list-style-type: none"> 1) Remove the 4 screws (S2) and remove the assembly. <p>Guide rail (SUP) assembly:</p> <ol style="list-style-type: none"> 1) Remove the screw (S2) and remove the assembly. <p><Attaching></p> <ol style="list-style-type: none"> 1) Return the guide pole fully to the unloading position, and attach the assemblies by reversing the removal procedures. When attaching, place the alignment markings of the two gears so that they face each other. (See Fig. 2-7-12(b).)  <p>Fig. 2-7-12(b)</p>

No.	Item	Reference picture/drawing	Procedure
13	⑳ Base plate assembly	 <p>Fig. 2-7-13</p>	<p><Removal></p> <p>1) Remove the screw (S2) and take out the assembly.</p> <p><Attaching></p> <p>1) Attach the assembly to the boss (L14) as if inserting, then clamp with the screw.</p>
14	㉑ Entrance guide base assembly, ㉒ Worm wheel 2, ㉓ Timing belt, ㉔ Center gear assembly	 <p>Fig. 2-7-14(a)</p>	<p><Removal></p> <p>1) The entrance guide base assembly can be removed by removing the screw (S2). Other parts can be removed by simply pulling them out.</p> <p><Attaching></p> <p>1) Reverse the removal procedure. See Fig. 2-7-14(b) for the worm wheel 2.</p>  <p>Align the phase of the rotary encoder assembly ㉔, then attach the main deck assembly by aligning the phase hole with the rotary encoder assembly.</p> <p>Fig. 2-7-14(b) Attaching Worm Wheel 2 ㉒</p>

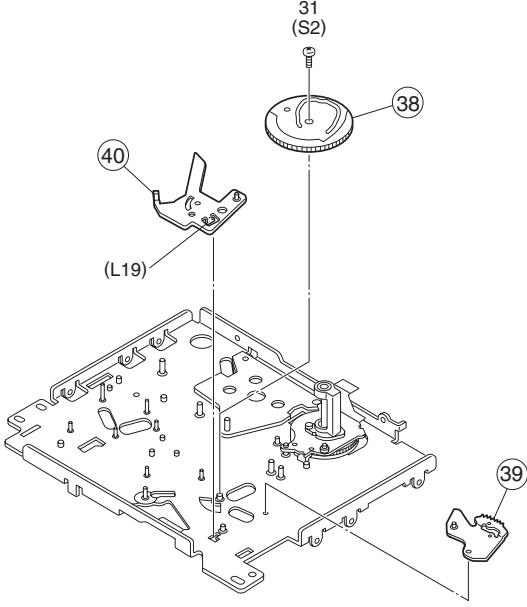
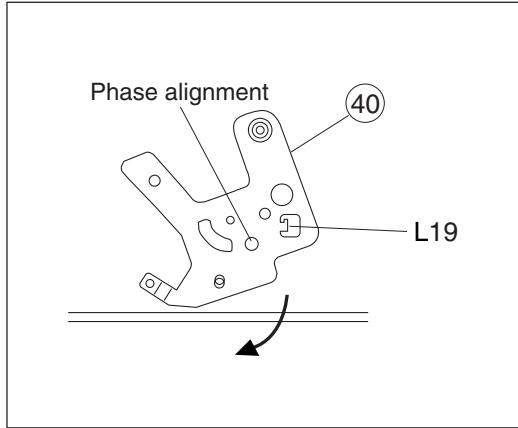
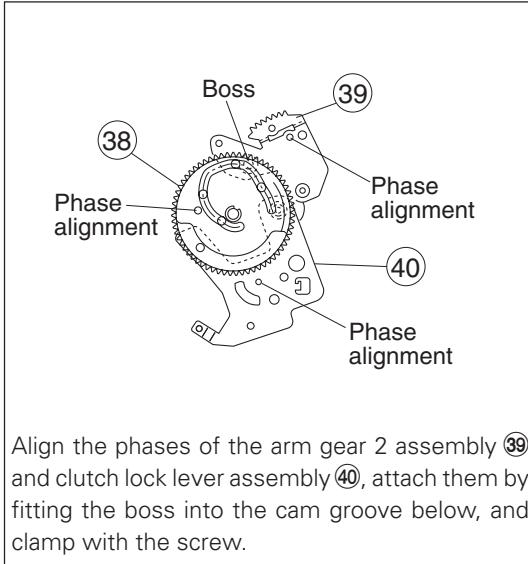
No.	Item	Reference picture/drawing	Procedure
15	②5 Reel drive pulley assembly, ②6 Push plate, ②7 Clutch lock gear (1), ②8 Clutch lock gear (2)	 <p>Fig. 2-7-15</p>	<p><Removal></p> <p>1) Remove the washer (W1) and take out the assembly.</p> <p><Attaching></p> <p>1) Reverse the removal procedure.</p>

No.	Item	Reference picture/drawing	Procedure
16	(29) Tension control arm assembly, (30) Brake control arm assembly, (31) Charge arm assembly	<p>Fig. 2-7-16(a)</p>	<p><Removal></p> <p>1) The brake control assembly can be removed after removing the washer (W1).</p> <p><Attaching></p> <p>1) Align the phases of the main cam and sub cam, then attach by reversing the removal procedure. Refer to Fig. 2-7-16(b) and Fig. 2-7-16(c).</p>
		<p>Align the phase of the main cam (35) then attach by fitting the bosses in the cam groove.</p>	<p>Phase alignment Boss (Phase alignment) Align the phase of the sub cam (38), then attach by fitting the boss into the cam groove.</p>
		<p>Fig. 2-7-16(b)</p> <p>Attaching Tension Control Arm Assembly (29) and Brake Control Arm Assembly (30)</p>	<p>Fig. 2-7-16(c) Attaching the Charge Arm Assembly (31)</p>

No.	Item	Reference picture/drawing	Procedure
17	③② Connect gear 2 (SUP), ③③ Connect gear 2 (TU)		<p><Removal></p> <p>1) Remove the screw (S2) and take out the gears.</p> <p><Attaching></p> <p>1) Reverse the removal procedure. The two connect gears 2 are given the same part number.</p> <p>NOTE</p> <ul style="list-style-type: none"> Align the phases of the main cam and sub cam when attaching.

Fig. 2-7-17

No.	Item	Reference picture/drawing	Procedure
18	(34) Rotary encoder assembly, (35) Main cam , (36) Arm gear 1 assembly, (37) Centering arm assembly	<p>Fig. 2-7-18(a)</p>	<p><Removal></p> <p>1)The rotary encoder can be removed by removing the 2 screws (S2). 2)The main cam can be removed by removing the washer (W1). As the cam gear is engaged at the rear of the main deck assembly while the phase is aligned, deviate the phase in the direction of the arrow before removal. (See Fig. 2-7-18(b).)</p> <p>Fig. 2-7-18(b) Removing the Centering Arm Assembly (37)</p>
		<p>Align the phase of the main cam (35), then attach by aligning the red-colored markings (A) (on 2 gear teeth) inside ○.</p>	<p><Attachments></p> <p>1)Align the phase by referring to Figs. 2-7-18(c) and 2-7-18(d), then attach the ass'sies reverse the removal procedure.</p>
		<p>Align the phases of the arm gear 1 assembly (36) and centering arm assembly (37), then align those of the arm gear 1 assembly (36) and centering arm assembly (37), attach the gear by fitting the bosses into the cam groove below, and fit the slit washers.</p>	<p>Fig. 2-7-18(c) Attaching the Rotary Encoder Assembly (34)</p> <p>Fig. 2-7-18(d) Attaching the Main Cam (35)</p>

No.	Item	Reference picture/drawing	Procedure
19	③8 Sub cam ③9 Arm gear 2 assembly, ④0 Clutch lock lever assembly	<p><Removal></p> <p>1) Remove the screw (S2) and take out the sub cam. As L19 is engaged at the rear of the main deck assembly while the phase is aligned, deviate the phase in the direction of the arrow before removal. 20. This checking should be done after completing the switching point adjustment.</p>  <p>Fig. 2-7-19(a)</p>	 <p>Fig. 2-7-19(b) Removing the Clutch Lock Lever Assembly ④0</p> <p><Attaching></p> <p>1) Align the phase correctly by referring to Fig. 2-7-19(c), then attach by reversing the removal procedure.</p>  <p>Align the phases of the arm gear 2 assembly ③9 and clutch lock lever assembly ④0, attach them by fitting the boss into the cam groove below, and clamp with the screw.</p> <p>Fig. 2-7-19(c) Attaching the Sub Cam ③8</p>

No.	Item	Reference picture/drawing	Procedure
20	④③ Cleaner assembly	 	<p><Removal></p> <ol style="list-style-type: none"> 1) Remove the washer (W2) 2) Take out the ④③ cleaner assembly. <p><Attaching></p> <ol style="list-style-type: none"> 1) Reverse the removal procedure. 2) Activate the cleaner (loading) and ensure that the cleaner contacts the drum normally. (Make sure that the cleaner rotation sound is heard.) <p><When an active head cleaner assembly is disassembled></p> <p>After the active head cleaner assembly has been disassembled and assembled, the following adjustment is required to restore the pressure of contact of the cleaner to the drum.</p> <ol style="list-style-type: none"> 1) Rotate screw ④③(A) fully clockwise until it is stopped, then rotate it counterclockwise by 2.5 turns. (The clamping torque is 4.9×10^{-4} N m/0.5 kgf cm or less) 2) Rotate screw ④③(B) fully clockwise until it is stopped, then rotate it counterclockwise by 0.5 of a turn. (The clamping torque is 4.9×10^{-4} N m/0.5 kgf cm or less) 3) Activate the cleaner (perform loading) and confirm that the contact between the claw, cleaner and drum is normal. (The rotation sound of the cleaner should be audible now.) 4) If the cleaner does not work normally, rotate screw ④③(B) clockwise by 1/8 turn and check the operation again.

Fig. 2-7-18(c)

2.8 CONFIRMATION AND ADJUSTMENT OF MECHANISM PHASES

See Fig. 2-8-1.

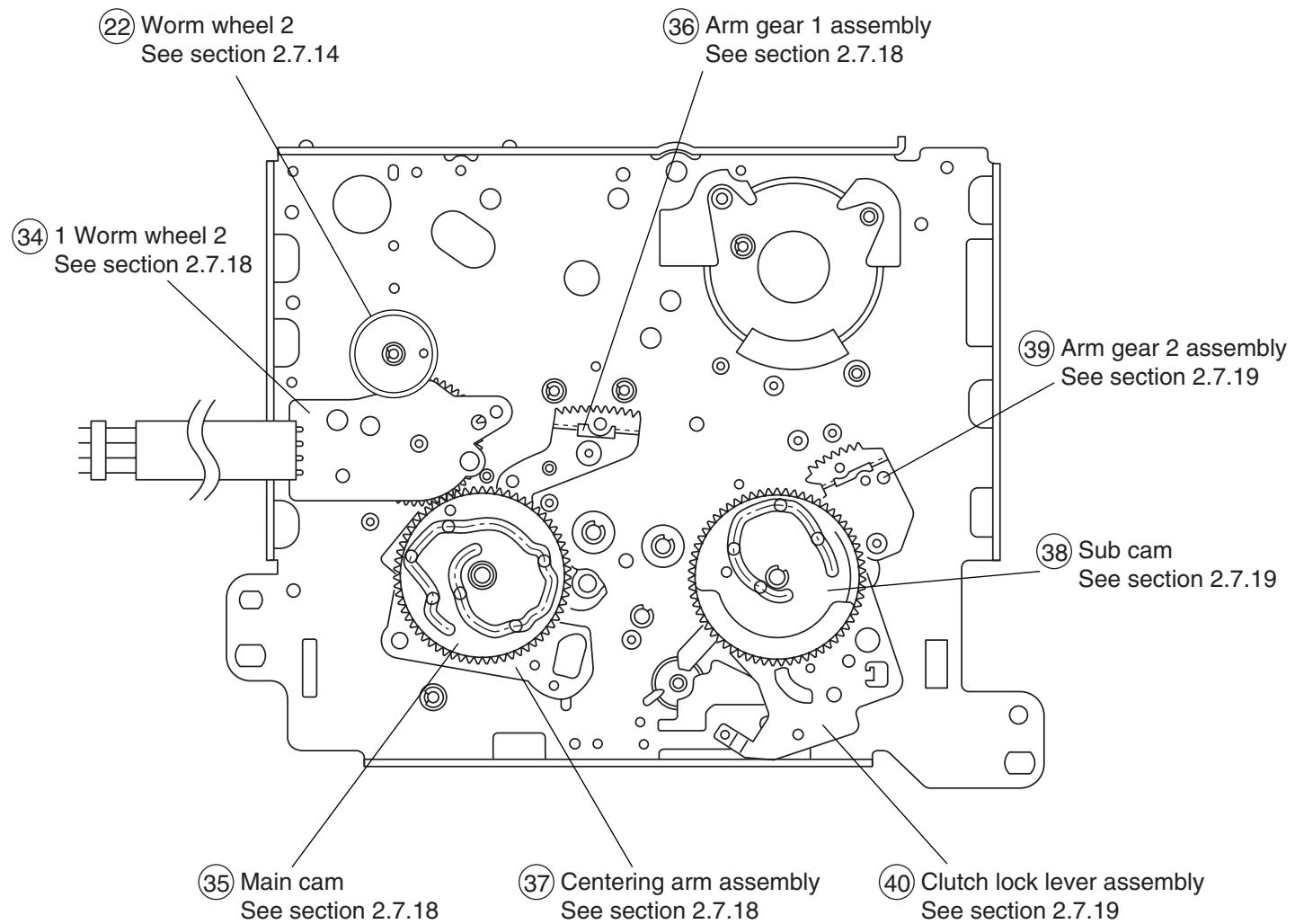
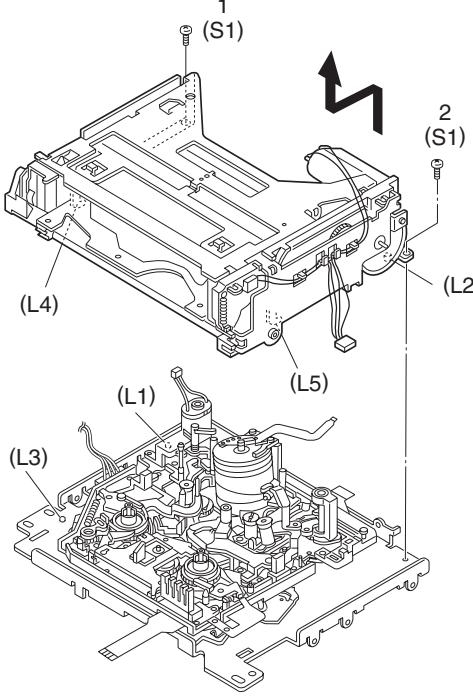
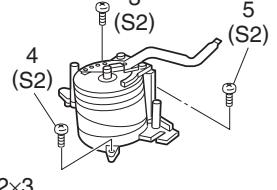
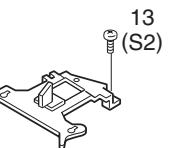
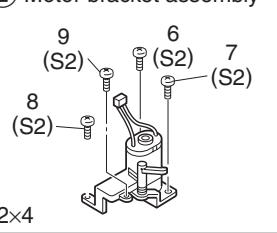
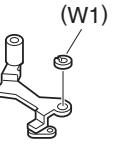
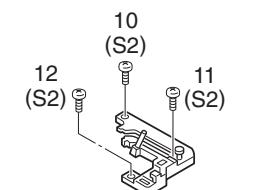
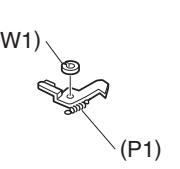
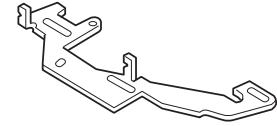
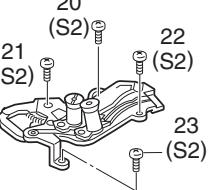
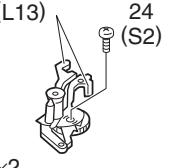
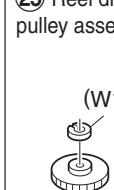
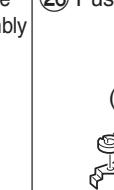
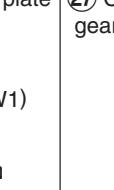
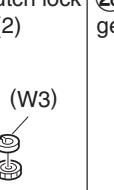
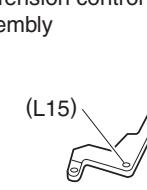
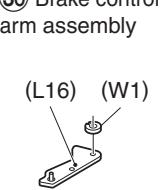
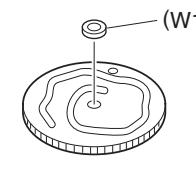
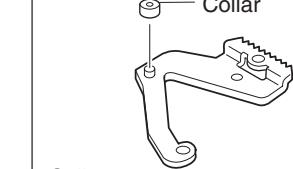
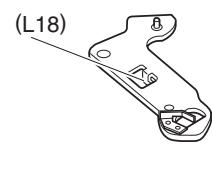
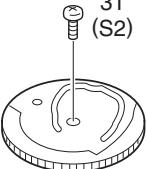


Fig. 2-8-1

2.9 MECHANISM DISASSEMBLY/ASSEMBLY SHEET

Screw Management																
Drawing No.	(A)	①	②	③	④	⑦	⑪									
No.	1 2	3 4 5	6 7 8 9	10 11 12	13 14	15 16 17	18									
Table	S1 S1	S2 S2 S2	S2 S2 S2 S2	S2 S2 S2	S2 S3	S2 S2 S2	S2 S2 S2									
Application																
Ref. No.	No.1	No.2			No.5			No.8	No.9							
(A) Cassette housing assembly  <p>Sx12,L1-L5</p>																
① Drum assembly  <p>S2x3</p>				④ Reel cover assembly  <p>S2,L6x2</p>				② Motor bracket assembly  <p>S2x4</p>				⑤ Pinch roller arm assembly  <p>W1,7</p>				
③ Middle catcher assembly  <p>S2x3</p>				⑥ Sub-brake assembly  <p>P1,W1,L8</p>				⑭ Control plate  <p>L12x2</p>				⑮ Guide rail (TU) assembly  <p>S2x4</p>				
⑯ Guide rail (SUP) assembly  <p>S2,L13x2</p>				⑰ Center gear assembly 				⑯ Reel drive pulley assembly 				⑰ Push plate 				
⑱ Clutch lock gear (2) 				⑲ Clutch lock gear (1) 				⑳ Tension control arm assembly 				⑳ Brake control arm assembly 				
㉑ Main cam 				㉒ Arm gear 1 assembly 				㉓ Centering arm assembly 				㉔ Sub cam 				

Screw Management													
⑯	⑯				⑯	⑯	⑯	⑯	⑯	⑯	⑯	⑯	⑯
19	20	21	22	23	24	25	26	27	28	29	30	31	32
S2	S2	S2	S2	S2	S2	S2	S2	S2	S2	S2	S2	S2	S2
No.11	No.12				No.13	No.14	No.17	No.18	No.19	-			

The slit washers cannot be reused once they have been removed.

<p>⑦ Band arm plate assembly</p> <p>(P2)</p> <p>S3,P2,L9,W2</p>	<p>⑪ Sub-deck assembly</p> <p>S2×4</p>	<p>⑫ Main brake (SUP) assembly</p> <p>(P4)</p> <p>P4,L10</p>	<p>⑬ Main brake (TU) assembly</p> <p>(P5)</p> <p>P5,L11</p>
<p>⑧ Tension arm assembly</p> <p>(P3)</p> <p>P3</p>		<p>⑭ Reel base assembly (SUP)</p> <p>(P4)</p>	<p>⑮ Reel base assembly (TU)</p> <p>(P5)</p>
<p>⑨ Exit guide arm assembly</p> <p>(W1)</p> <p>W1</p>	<p>⑩ Swing arm assembly</p>	<p>⑯ Prism</p> <p>19 (S2)</p> <p>S2</p>	
<p>⑳ Base plate (TU) assembly</p> <p>25 (S2)</p> <p>S2,L14×2</p>	<p>㉑ Entrance guide base assembly</p> <p>26 (S2)</p> <p>S2</p>	<p>㉒ Worm wheel 2</p>	<p>㉓ Timing belt</p>
<p>㉑ Charge arm assembly</p> <p>(L17)</p> <p>L17</p>	<p>㉒ Connect gear 2</p> <p>27 (S2)</p> <p>S2</p>	<p>㉓ Connect gear 2</p> <p>28 (S2)</p> <p>S2</p>	<p>㉔ Rotary encoder assembly</p> <p>29 (S2)</p> <p>30 (S2)</p> <p>S2×2</p>
<p>㉕ Arm gear 2 assembly</p> <p>(L19)</p>	<p>㉖ Clutch lock lever assembly</p> <p>(L19)</p>	<p>㉗ Capstan motor</p> <p>ADJ NUT</p> <p>(P7)</p>	<p>㉘ Drum base deck</p> <p>32 (S2)</p> <p>33 (S2)</p> <p>34 (S2)</p> <p>S2×3</p>

2.10 DISASSEMBLY PROCEDURE LIST

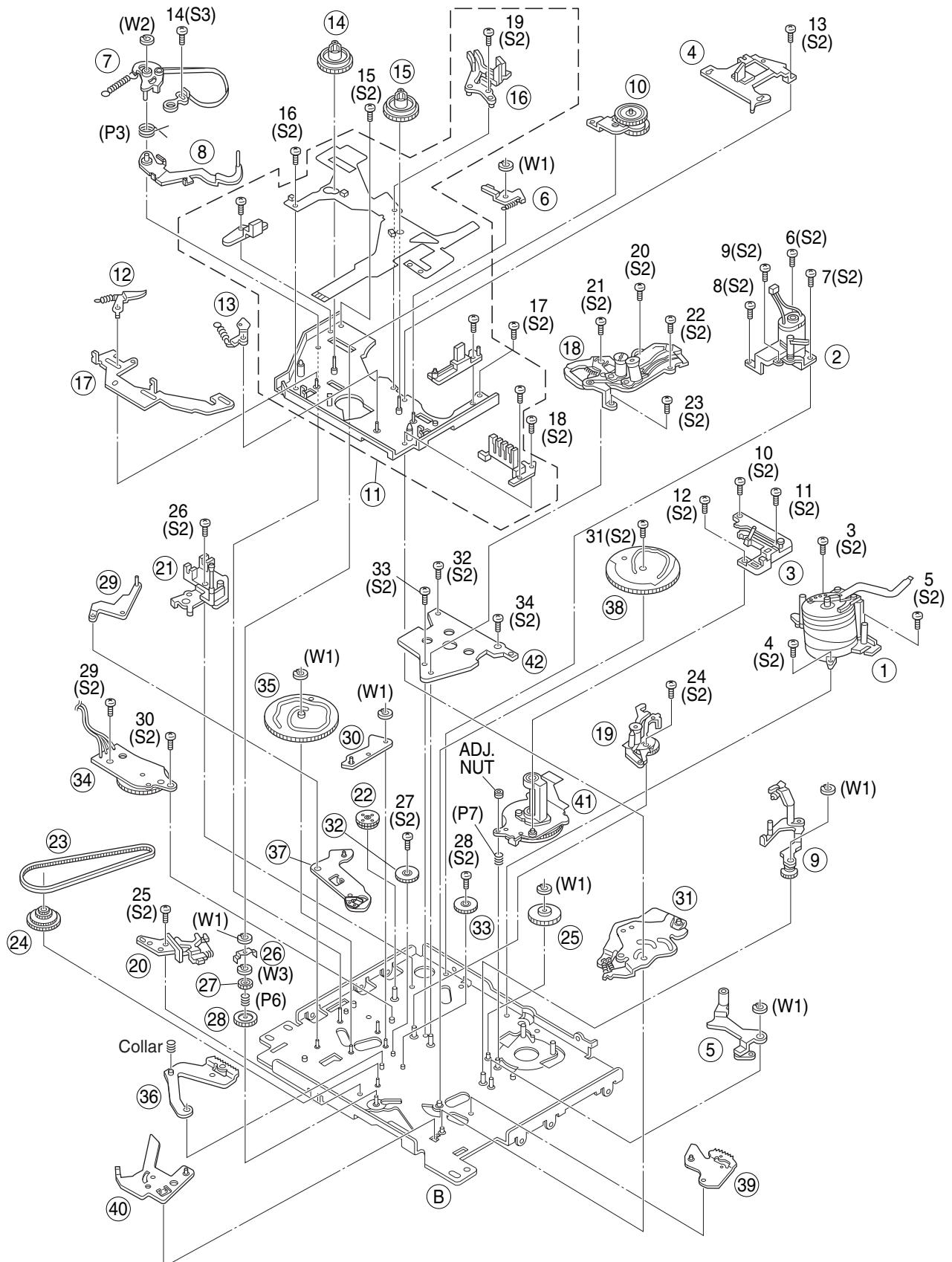
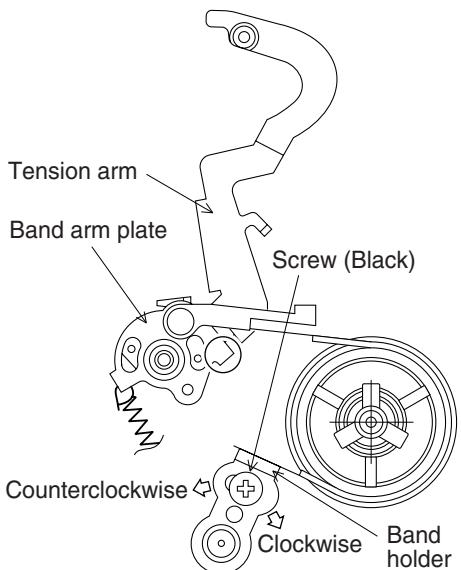


Fig. 2-9-1

Fig. 2-9-1

2.11 TORQUE ADJUSTMENTS

No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (①) Adjustment level (☆)	Adjustment procedure
1	SUP backup torque adjustment	•Cassette torque meter	Play	◎ Supply side indication of cassette torque meter ☆ $3.9^{+1.47}_{-0.39} \times 10^{-4}\text{N m}$ ($4.0^{+1.5}_{-0.4} \text{ gf cm}$)	<p>(1) Insert the cassette torque meter and enter play mode.</p> <p>(2) The supply backup torque should be as specified. (If it fluctuates, read the center value.)</p> <p>(3) If it is out of specification, eject the tape, remove the cassette housing, loosen the screw (black) slightly and fine-adjust the band holder. Slightly turn the band holder as follows.</p> <ul style="list-style-type: none"> · To increase torque: Counterclockwise · To decrease torque: Clockwise. <p>NOTE The screw securing torque should be 0.0588 N·m (0.6 kgf·cm).</p> <p>4) Check the supply backup torque again and repeat the above steps until it becomes as specified.</p> 
2	TU torque check	•Cassette torque meter	Play	◎ Take-up side indication of cassette torque meter ☆ $4.9^{+3.92}_{-1.96} \times 10^{-4}\text{N m}$ ($5.0^{+4.0}_{-2.0} \text{ gf cm}$)	<p>(1) Insert the cassette torque meter and enter play mode.</p> <p>(2) Ensure that the take-up torque is as specified.</p> <p>If it is out of specification, check the assembly of the reel drive parts and the center gear assembly.</p>

2.12 COMPATIBILITY ADJUSTMENT

2.12.1 Compatibility Adjustment Flow Chart

Fig. 2-12-1 shows the flow chart of compatibility adjustment.

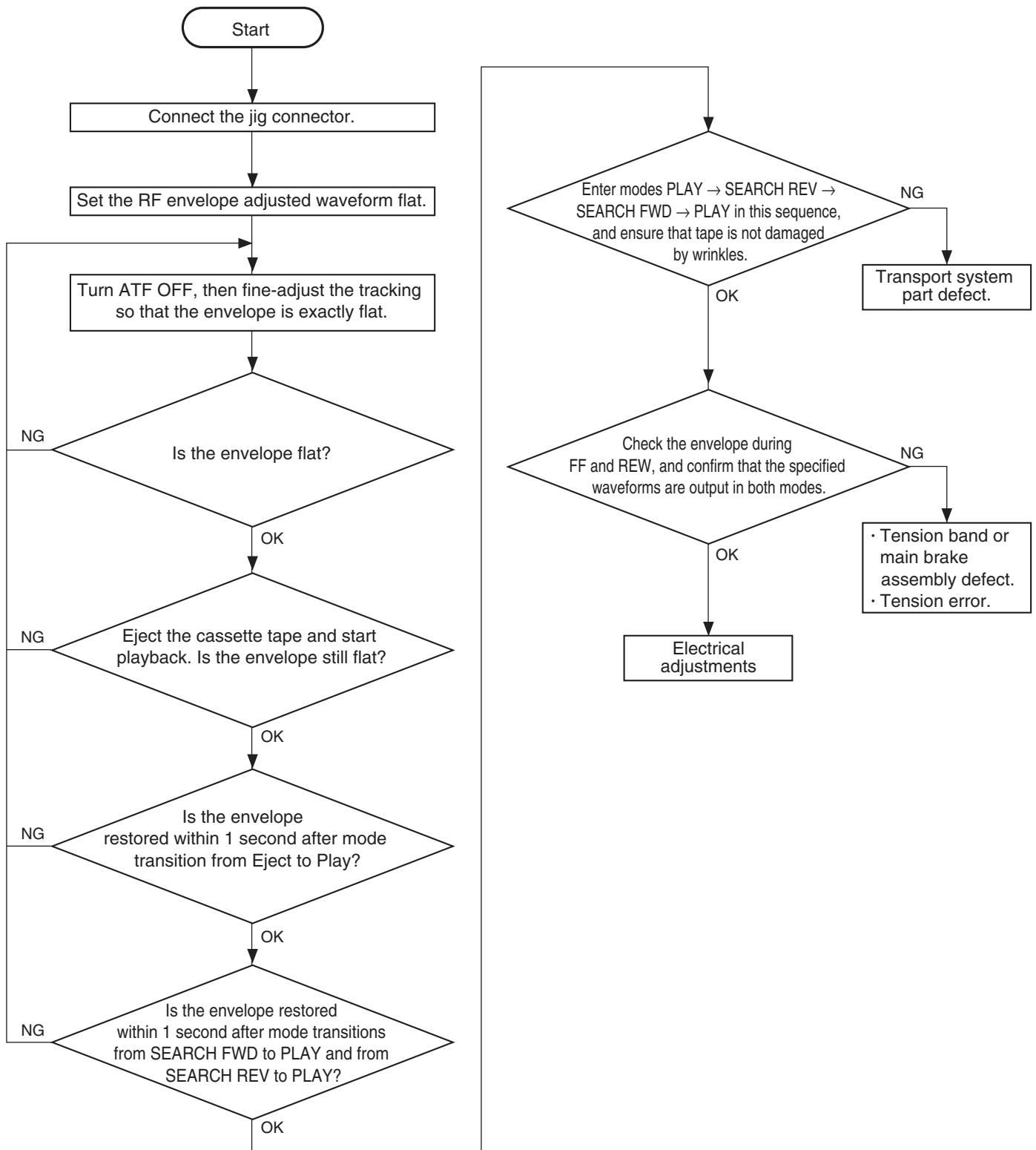


Fig. 2-12-1

2.12.2 Before Adjustments

Table 2-12-1 shows the adjustments to be enforced after servicing.

Adjustment Item Servicing	2.12.5 Linearity Adjustment	3.6.7 Play Switching Point Adjustment	3.6.8-3 Error Rate (PB EQ) Adjustment	3.6.8-1 REC Current Adjustment
Drum replacement	Note 1 Required	Required	Required	Required
Required	Note 1 Required	Not required	Check	Not required
IC901 replacement (PRE/REC amp on P/R & MDA board)	Not required	Not required	Check	Required
IC501 replacement (PB EQ on DV Main board)	Not required	Not required	Required	Not required
DV Main board replacement	Not required Note 2	Required	Required	Required

Table 2-12-1

2.12.3 Adjustment Setup

As shown in Fig.2-12-2 below, connect the connector cable to CN104 on the DV MAIN board and then connect it to the PC cable

Note 1 : Check is required after servicing or replacement related to the drum, TU/ SUP guide rails or tension.

Note 2 : After having replaced the DV Main board, be sure to write the original data in the EEPROM (IC103) of the new board. If the original data cannot be written due to communication failure, mount the original EEPROM to the new board.

The following data are written in the EEPROM (IC103) on the DV MAIN board.

- EVR adjustment value data
- Hour meter
- Warning history
- IEEE1394 ID code

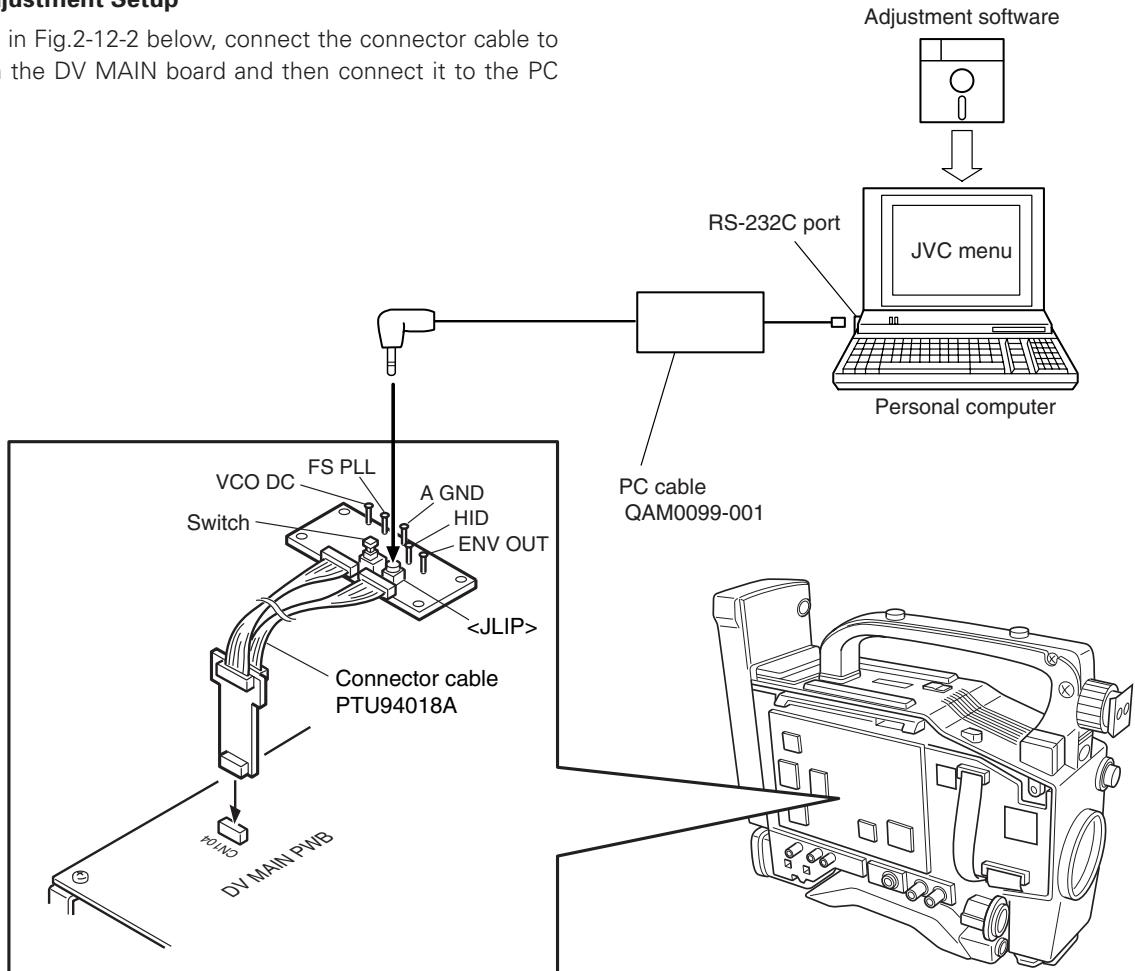


Fig. 2-12-2 Adjustment Setup

2.12.4 Tape Transport Restriction

The unit uses only the SUP guide roller and TU guide roller to restrict the tape transport. The tape is free (no restriction) from other parts.

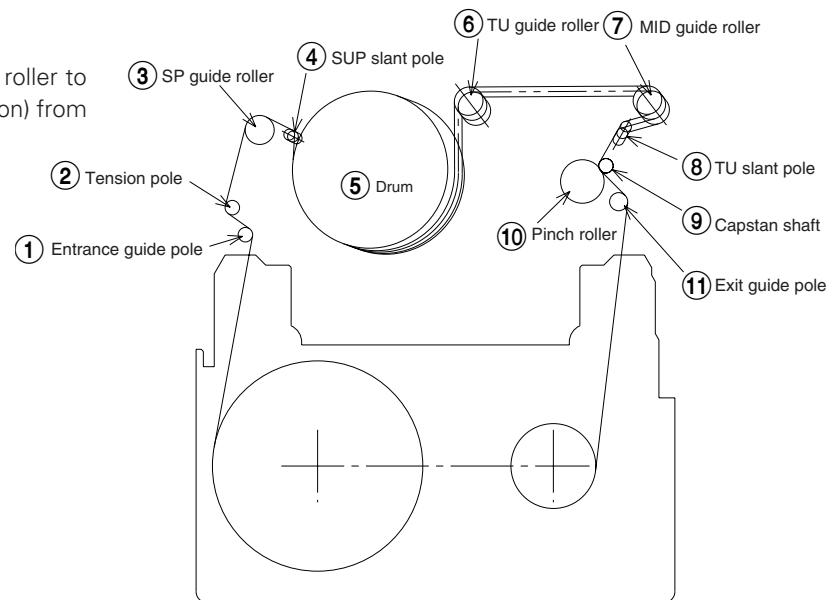


Fig. 2-12-3

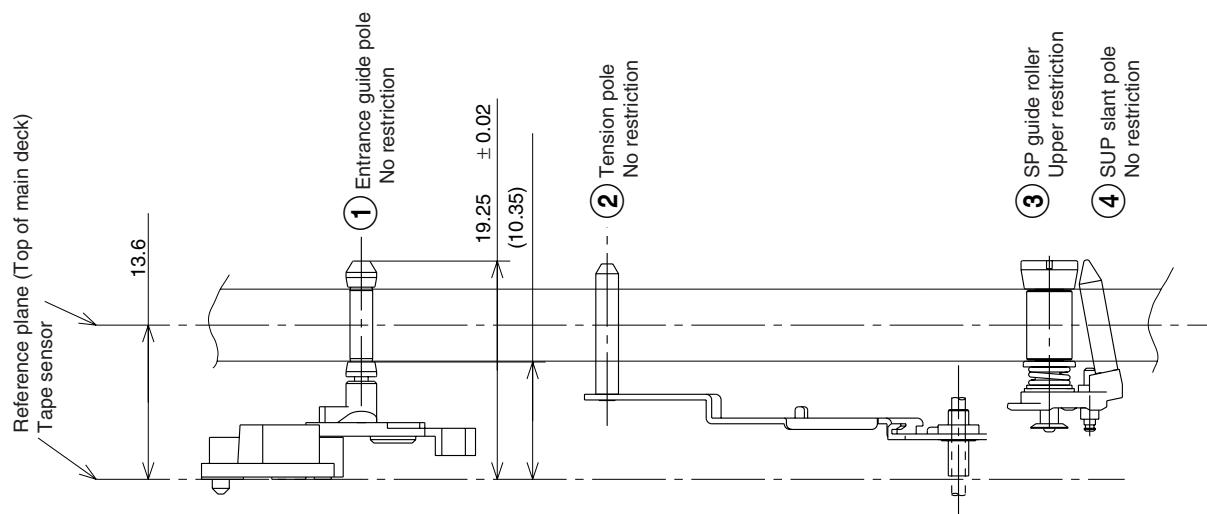


Fig. 2-12-4 Tape Restriction on Supply Side

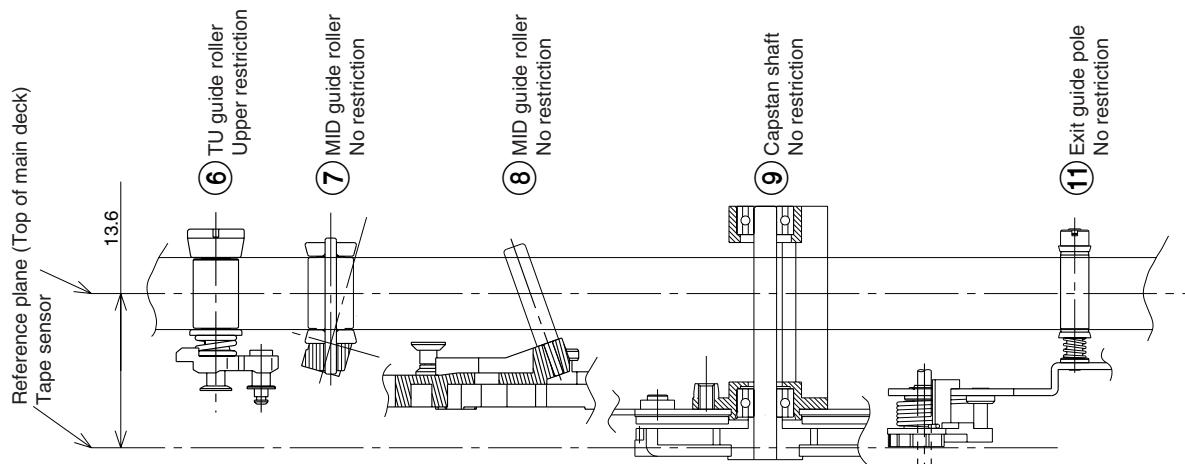


Fig. 2-12-5 Tape Restriction on Take-up Side

No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (①) Adjustment level (☆)	Adjustment procedure
-----	------	---------------------------------------	------	---	----------------------

2.12.5 Compatibility Adjustment

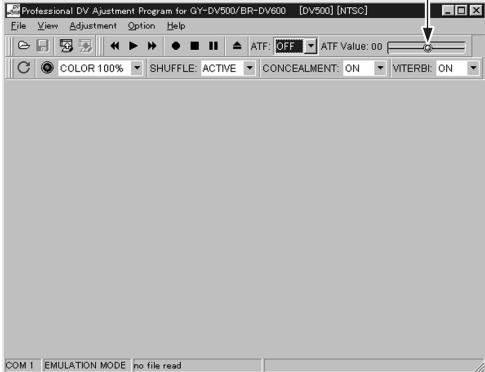
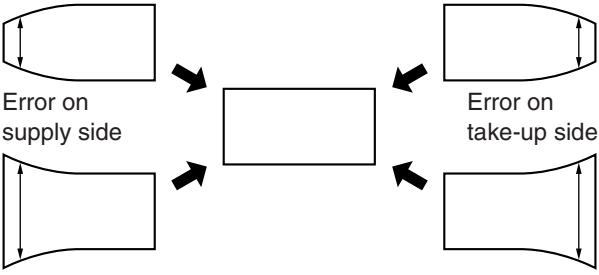
1	Preparation			<p>Drag here to vary the tracking.</p> 	<p>(1) Set up the adjustment software (see section 2.12.3, "Setup") and execute the program. (2) If it is required to switch the auto tracking function, set [ATF] to "OFF". When the ATF Value appears, vary the tracking value as desired.</p> <p>NOTE</p> <ul style="list-style-type: none"> Be sure to clean the tape transport parts and play a cleaning tape before proceeding to the compatibility adjustment.
2	RF envelope adjustment	<ul style="list-style-type: none"> Error on supply side Oscilloscope, alignment tape MC-1(NTSC) MC-2(PAL) Color bar portion 	Play	<p>◎ ENV OUT [jig connector] ◎ HID [jig connector] ① Supply guide roller ① Take-up guide roller ☆ Make the waveforms flat. The drop level should be less than 3 dB with both SUP and TU levels. ☆ Flatness variation should be less than 2 dB.</p>	<p>(1) Play alignment tape color bar portion. (2) Observe the measuring points and adjust the supply guide roller and take-up guide roller so that the RF waveform is flat. (3) Set [ATF] to OFF and vary tracking. (4) Fine-adjust the supply and take-up guide rollers to make the waveform exactly flat. (5) Set the mode to EJECT, then set to the PLAY mode and ensure that the RF waveform is flat.</p> 

Fig. 2-12-7

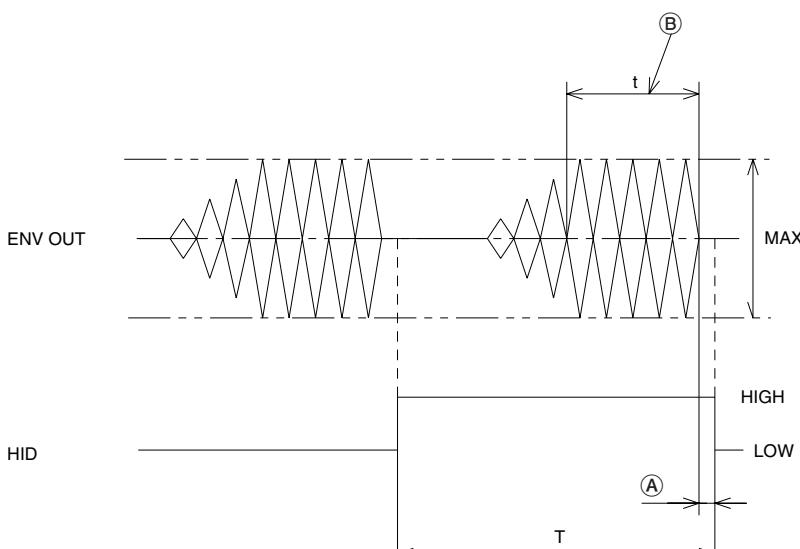
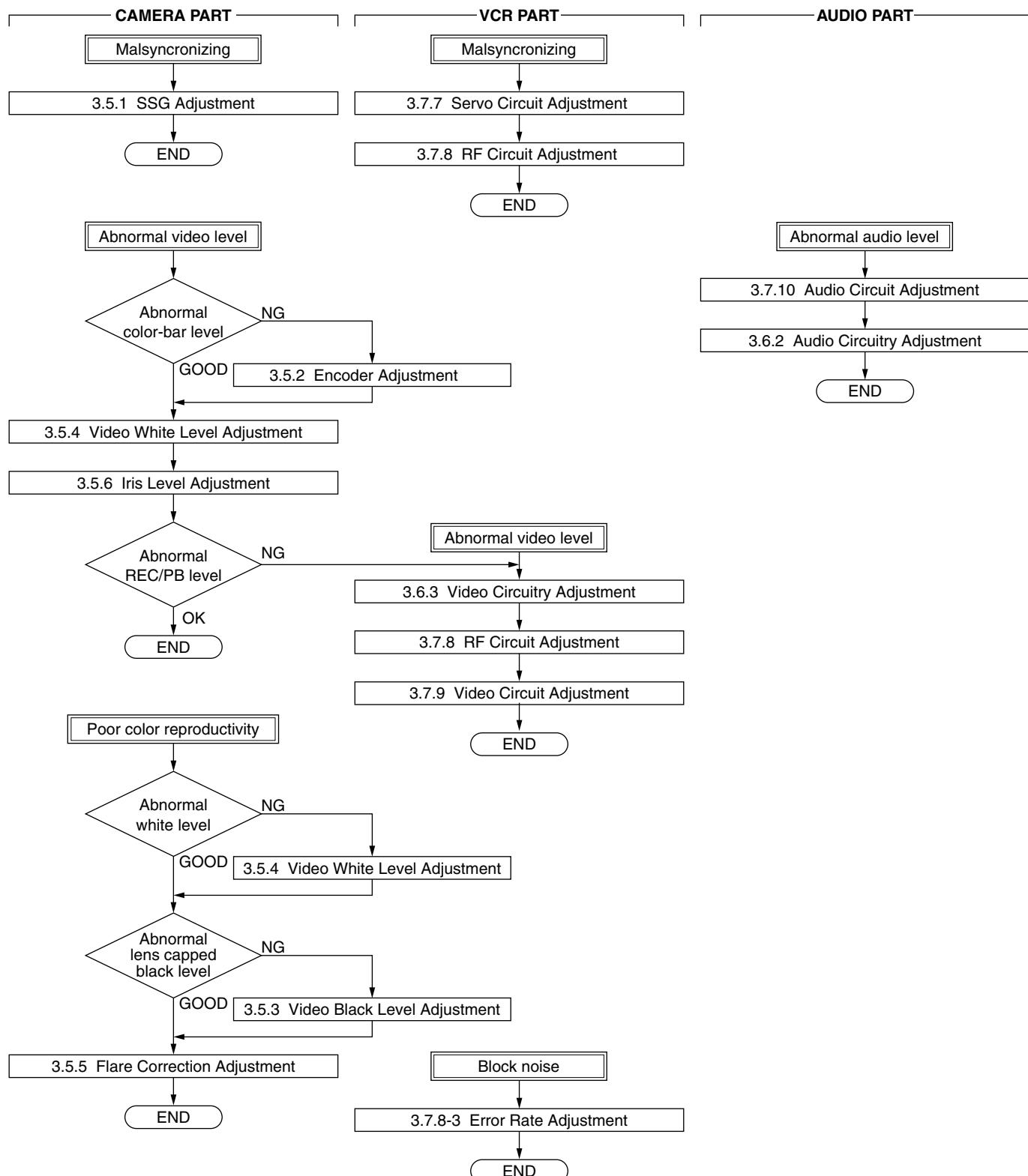
No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (↑) Adjustment level (☆)	Adjustment procedure
3	Waveform rise check	• Oscilloscope, alignment tape MC-1(NTSC) MC-2(PAL) Color bar portion	Eject → Play Search FWD → Play Search REV → Play	◎ ENV OUT [jig connector] ◎ HID [jig connector] ☆ The envelope waveform should be restored within 1 sec.	<p>(1) Switch the mode from Eject → Play and ensure that the envelope waveform is restored in less than 1 sec.</p> <p>(2) Switch the mode from Search FWD → Play and from Search REV → Play, and ensure that the envelope is restored in less than 1 sec. in both cases.</p> <p>(3) If the waveform does not restore in the specified period, fine-adjust the supply/take-up guide rollers as far as the envelope waveform specification is met, then restart checking from the above procedure 1 again.</p>
4	Damage check	• Self-recorded/played tape 60ME	Play ↓ Search REV ↓ Search FWD ↓ Play	◎ ENV OUT [jig connector] ◎ HID [jig connector] ☆ The tape should not be damaged by wrinkle.	<p>(1) Transport the self-recorded/played tape from the beginning by changing modes in order of Play → Search REV → Search FWD → Play, and ensure that wrinkles due to strong restriction by the guide rollers and guide pole are not produced on tape.</p> <p>(2) Perform the same check at the section near the end of tape.</p>
5	Envelope check during FF/REW	• Oscilloscope, alignment tape MC-1(NTSC) MC-2(PAL) Color bar portion	FF REW	◎ ENV OUT [jig connector] ◎ HID [jig connector] ☆ A > 55μsec. ☆ B ≥ T/3	<p>(1) Insert the alignment tape and enter Stop mode.</p> <p>(2) Enter FF mode.</p> <p>(3) Ensure that the envelope output is present at 55 (s before the HID switching timing.</p> <p>(4) Check the take-up side of the envelope to see that the MAX output duration is more than 1/3 the HID duration.</p> <p>This checking should be done after completing the switching point adjustment.</p> <p>(5) Enter REW mode and check the same items as (3) and (4) above.</p> <p>(6) If the envelope is out of specification, check the tension band and main brake assembly and replace as required. Confirm the playback switching point.</p> 

Fig. 2-12-8

SECTION 3 ELECTRICAL ADJUSTMENTS

3.1 FLOWCHART OF ELECTRICAL ADJUSTMENTS



3.2 FUNCTIONS REQUIRED FOR ADJUSTMENTS, SETUP

3.2.1 General instruments necessary for adjustment

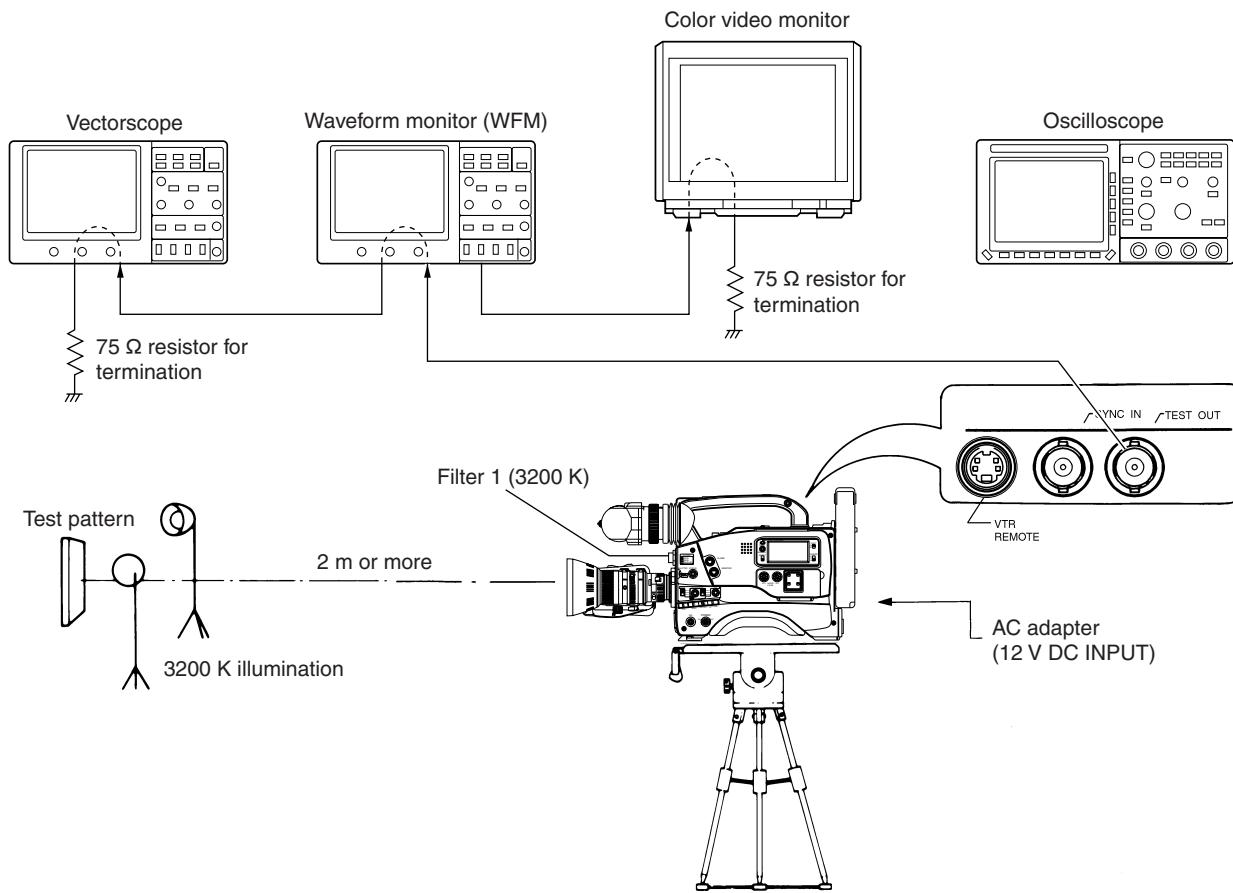
Instrument	Condition	Instrument	Condition
Oscilloscope	Calibrated instrument with a measuring bandwidth of 100 MHz or more.	Frequency counter	Instrument calibrated for 8 digits or more. Stability of 0.1 ppm or 1×10^{-7} or better is required at 0 to 40°C.
Vectorscope	Calibrated instrument	Monitor TV	Color video monitor with a 75Ω video input.
Audio tester	Calibrated instrument		

3.2.2 Special implements required for adjustment

1	Computer	2	Waveform monitor (WFM)	3	Gray scale chart (Part No.:GS2L)
4	Lens S14X7.3B12 or equiv.	5	Viewfinder VF-P115B or equiv.	6	Tripod base
7	Power supply unit AA-P250 or equiv.	8	Monitor TV	9	Alignment tape MC-1 : NTSC MC-2 : PAL
10	Connector cable PTU94018A	11	Adjustment software PLSC1304	12	PC cable QAM0099-001

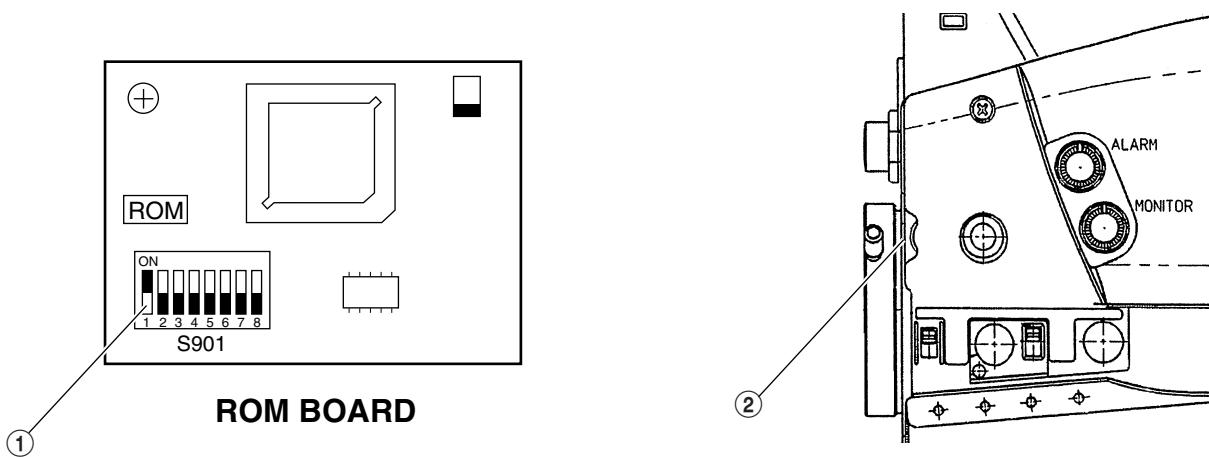
Fig. 3-1-1 Special implements required for adjustment

3.3 STANDARD SETUP



3.4 ADJUSTMENT MENU

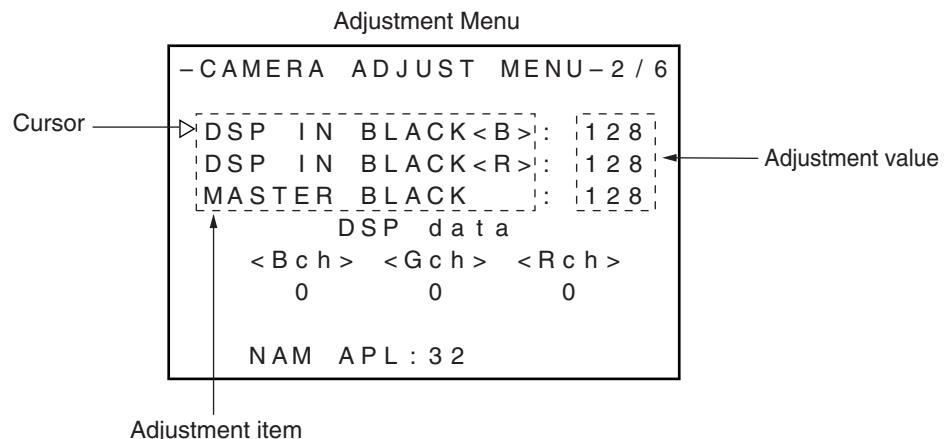
3.4.1 Switches and Functions Used in Adjustments



- ① SW901-1 on ROM board : Set to ON (up) to display the adjustment menu on the viewfinder screen and enter the adjustment mode.
Set to OFF (down) to turn off the adjustment menu on the viewfinder screen and exit from the adjustment mode.
- ② SHUTTER/MENU dial : Used to select an adjustment item, adjust the selected item and store the adjusted value in memory.

3.4.2 Operation Procedure

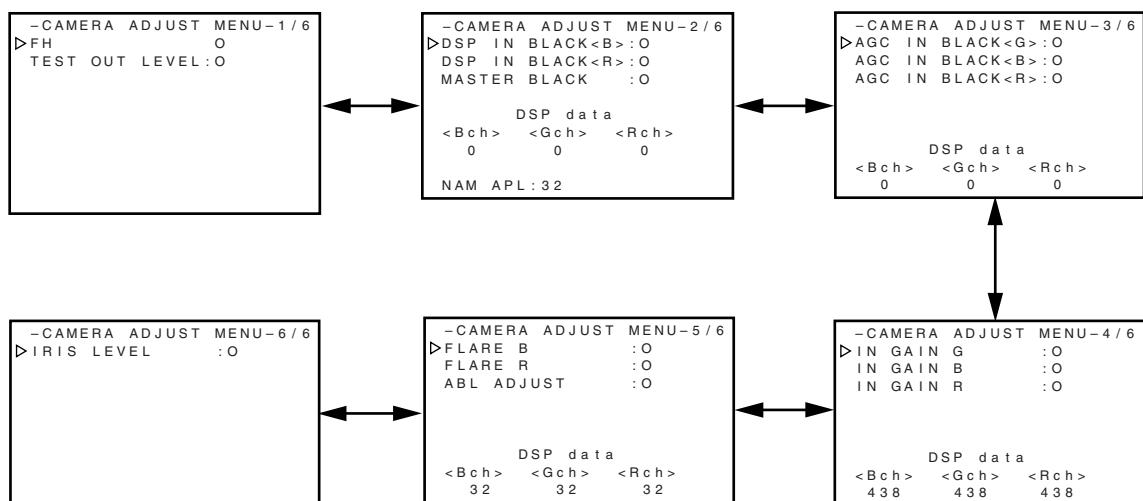
- (1) Open the right side cover and set the DIP switch SW901-1 on the ROM board to ON (up).
- (2) When the cursor on the left of an item is blinking and the adjustment value is lit steadily, rotating the SHUTTER/MENU dial selects the adjustment item. Rotate this dial continuously to turn over the page of the MENU screen.
- (3) When the cursor on the left of an item is blinking and the adjustment value is lit steadily, pushing the SHUTTER/MENU dial causes the selected item to blink.
- (4) When the cursor on the left of an item is blinking and the adjustment value is blinking, rotating the SHUTTER/MENU dial varies the adjustment value.
- (5) When the cursor on the left of an item is blinking and the adjustment value is blinking, pushing the SHUTTER/MENU dial stores the adjustment value in memory and returns to the adjustment item selection step.
- (6) Set the DIP switch SW901-1 on the ROM board to OFF (down) to exit from the adjustment mode.

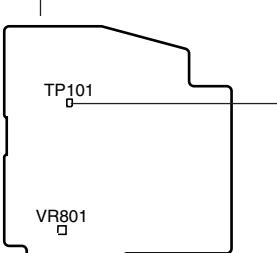
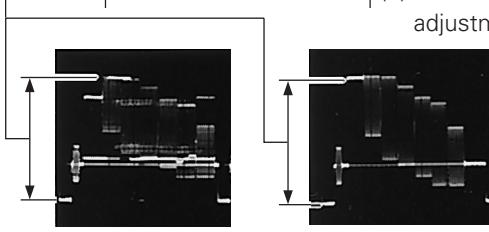
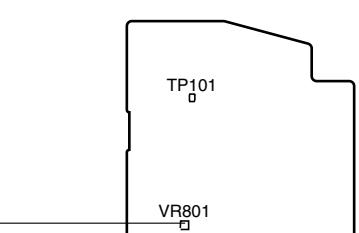
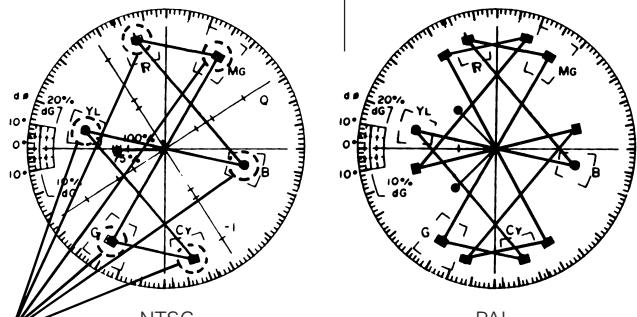
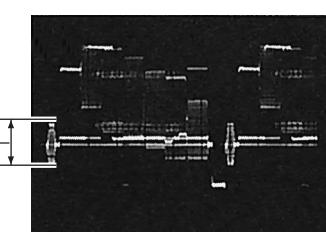


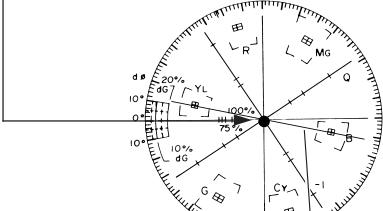
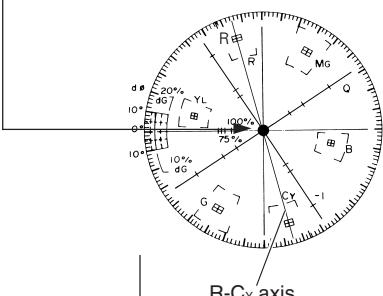
Cursor	Adjustment Value	SHUTTER/MENU Dial	
		Rotate	Push
Blinking	Steady lighting	Selects an adjustment item.	Adjustment value blinks.
Blinking	Blinking	Varies an adjustment value.	Stores adjustment value in memory.

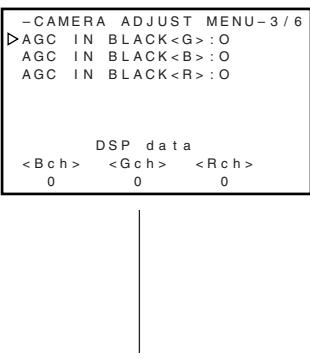
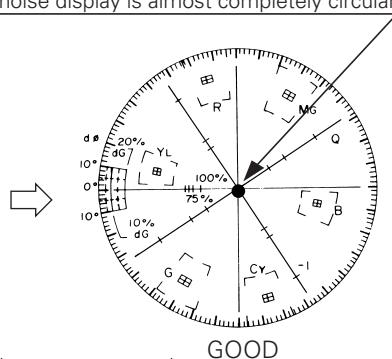
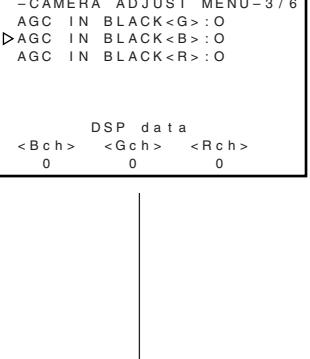
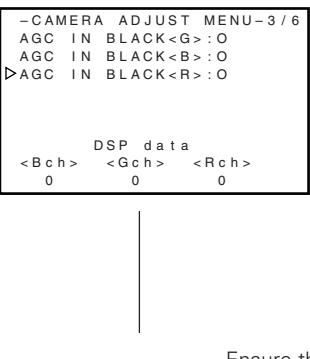
Functions of SHUTTER/MENU Dial

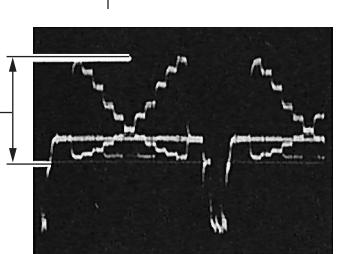
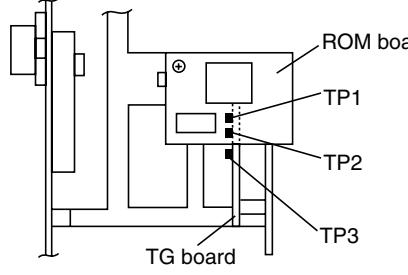
3.4.3 Flowchart of ADJUST MENU



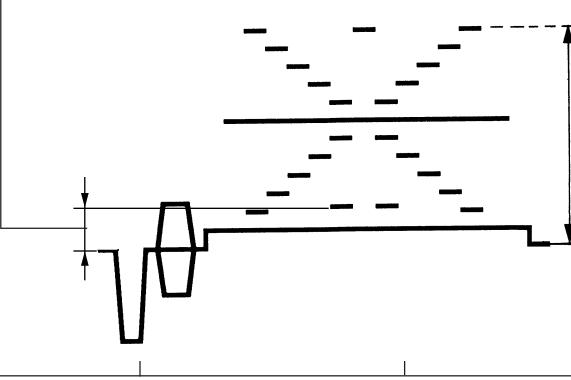
No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (①) Adjustment level (☆)	Adjustment procedure
3.5 CAMERA ADJUSTMENTS					
3.5.1 SSG Adjustment					
1	fh frequency adjustment	• Frequency counter	Adjustment menu 1/6 (Color bar output)	◎ TP101 (CAM2) ① SHUTTER/MENU dial ☆ 27 MHz \pm 30 Hz	<p>(1) Open the left side cover.</p> <p>(2) Rotate the SHUTTER/MENU dial to select MENU 1/6: FH.</p> <p>(3) Push the SHUTTER/MENU dial so that the adjustment value blinks then rotate it to adjust to the specified level.</p> <p>(4) Push the SHUTTER/MENU dial to store the adjustment data in memory.</p>
					
3.5.2 Encoder Adjustments					
1	TEST OUT LEVEL adjustment	• Oscilloscope (H-rate, 10:1) or WFM	Adjustment menu 1/6 (Color bar output)	◎ TEST OUT (75 Ω terminated) ① SHUTTER/MENU dial ☆ 1 Vp-p \pm 0.003 Vp-p (140 IRE \pm 4 IRE)	<p>(1) Rotate the SHUTTER/MENU dial to select MENU 1/6: TEST OUT LEVEL.</p> <p>(2) Push the SHUTTER/MENU dial so that the adjustment value blinks then rotate it to adjust to the specified level.</p> <p>(3) Push the SHUTTER/MENU dial to store the adjustment data in memory.</p>
					
2	CHROMA LEVEL adjustment	• Oscilloscope (H-rate, 10:1) or WFM • Vectorscope	Adjustment menu 1/6 (Color bar output)	◎ TEST OUT (75 Ω terminated) ① VR801 (CAM2) ☆ All the spots of the color bar signal should be within the ■ marks of the vectorscope and the burst level should be as specified.	<p>(1) Open the left side cover.</p> <p>(2) Adjust VR801 on the CAM2 board to the specified level.</p>
					
					
				<p>NTSC</p> <p>PAL</p> <p>Adjust so that all the spots are located inside the ■ marks.</p>	
					

No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (↑) Adjustment level (☆)	Adjustment procedure				
3.5.3 Video Black Level Adjustments									
1	DSP IN BLACK adjustment	<ul style="list-style-type: none"> • Oscilloscope (H-rate, 10:1) or WFM • Vectorscope • Lens capped or iris closed. <pre>-CAMERA ADJUST MENU-2 / 6 >DSP IN BLACK:0 DSP IN BLACK<R>:0 MASTER BLACK :0 DSP data <B ch> 0 <G ch> 0 <R ch> 0 NAM APL:32</pre>	Adjustment menu 2/6	<p>◎ TEST OUT (75 Ω terminated) ↑ SHUTTER/MENU dial ☆ Position the noise on the B-Y_L axis at the center of the vectorscope.</p>  <p>B-Y_L axis</p> <p>☆ Position the noise on the R-C_Y axis at the center of the vectorscope.</p>  <p>R-C_Y axis</p> <p>☆ Position NAM APL at the center of 32 MASTER BLACK variation range.</p> <pre>-CAMERA ADJUST MENU-2 / 6 DSP IN BLACK:0 DSP IN BLACK<R>:0 >MASTER BLACK :0 DSP data <B ch> 0 <G ch> 0 <R ch> 0 NAM APL:[32]</pre>	<ol style="list-style-type: none"> Rotate the SHUTTER/MENU dial to select MENU 2/6: DSP IN BLACK . Push the SHUTTER/MENU dial so that the adjustment value blinks then rotate it to adjust to the specified level. Push the SHUTTER/MENU dial to store the adjustment data in memory. <ol style="list-style-type: none"> Rotate the SHUTTER/MENU dial to select MENU 2/6: DSP IN BLACK <R>. Push the SHUTTER/MENU dial so that the adjustment value blinks, then rotate it to adjust to the specified level. Push the SHUTTER/MENU dial to store the adjustment data in memory. <ol style="list-style-type: none"> Rotate the SHUTTER/MENU dial to select MENU 2/6: MASTER BLACK. Push the SHUTTER/MENU dial so that the adjustment value blinks, then rotate it to adjust to the specified level. Push the SHUTTER/MENU dial to store the adjustment data in memory. <ol style="list-style-type: none"> Check the following condition. <table border="1"> <tr> <td>NTSC</td> <td>5.3 ± 7 Vp-p</td> </tr> <tr> <td>PAL</td> <td>0 ± 7 Vp-p</td> </tr> </table> <p>Carrier: less than 30 mVp-p</p>	NTSC	5.3 ± 7 Vp-p	PAL	0 ± 7 Vp-p
NTSC	5.3 ± 7 Vp-p								
PAL	0 ± 7 Vp-p								

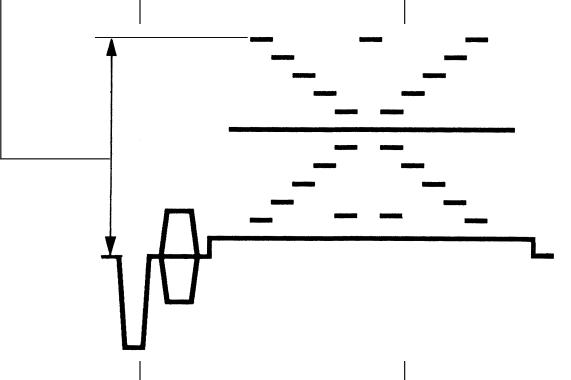
No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (①) Adjustment level (☆)	Adjustment procedure
2	AGC IN BLACK adjustment	<ul style="list-style-type: none"> • Oscilloscope (V-rate, 10:1) or WFM • Lens capped or iris closed. • Vectorscope 	<p>Adjustment menu 3/6 GAIN SW H (+18 dB)</p>  <p>Ensure that noise display is almost completely circular.</p> 	<p>◎ TEST OUT (75 Ω terminated) ① SHUTTER/MENU dial ☆ Minimize V shading.</p>  <p>☆ Minimize V shading.</p>  <p>☆ Minimize V shading.</p>	<p>(1) Rotate the SHUTTER/MENU dial to select MENU 3/6: AGC IN BLACK <G>. (2) Push the SHUTTER/MENU dial so that the adjustment value blinks then rotate it to adjust to the specified level. (3) Push the SHUTTER/MENU dial to store the adjustment data in memory.</p> <p>(4) Rotate the SHUTTER/MENU dial to select MENU 3/6: AGC IN BLACK . (5) Push the SHUTTER/MENU dial so that the adjustment value blinks then rotate it to adjust to the specified level. (6) Push the SHUTTER/MENU dial to store the adjustment data in memory.</p> <p>(7) Rotate the SHUTTER/MENU dial to select MENU 3/6: AGC IN BLACK <R>. (8) Push the SHUTTER/MENU dial so that the adjustment value blinks then rotate it to adjust to the specified level. (9) Push the SHUTTER/MENU dial to store the adjustment data in memory.</p> <p>(10) Check that the noise display on the vectorscope is close to a true circle. If the circle is distorted, repeat (1) to (9) until it approaches a true circle. (11) Set the GAIN SW to L (0dB).</p>

No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (↑) Adjustment level (☆)	Adjustment procedure
3.5.4 Video White Level Adjustments					
1	IN GAIN adjustment	<ul style="list-style-type: none"> • Oscilloscope (H-rate, 10:1) or WFM • Gray scale chart (precisely scanned size) 	<p>Adjustment menu 4/6</p> 	<p>◎ TP2 (TG, Open the left side cover) ↑ Lens iris ☆ 1.00 ± 0.01 Vp-p</p> <p>-CAMERA ADJUST MENU - 4 / 6 IN GAIN G : 0 IN GAIN B : 0 IN GAIN R : 0</p> <p><B ch> 4 3 8 <G ch> 4 3 8 <R ch> 4 3 8</p>	<p>(1) Rotate the SHUTTER/MENU dial to select MENU 4/6: IN GAIN <G>. (2) Shoot the gray scale chart and adjust the lens iris so that the white peak level is as specified.</p> 

No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (①) Adjustment level (☆)	Adjustment procedure
3.5.5 Flare Correction Adjustments					
1	Flare adjustment	<ul style="list-style-type: none"> • Oscilloscope (H-rate, 10:1) or WFM • Gray scale chart (precisely scanned size) 	Adjustment menu 5/6	<p>◎ TEST OUT (75 Ω terminated) ① Lens iris ☆ NTSC 0.714 Vp-p PAL 0.7 Vp-p</p> <p>↓ Opened by 1 f-stop</p> <p>-CAMERA ADJUST MENU-5 / 6 FLARE B : 0 FLARE R : 0 ABL ADJUST : 0</p> <p>DSP data < B ch > 32 < G ch > 32 < R ch > 32</p>	<p>(1) Rotate the SHUTTER/MENU dial to select MENU 5/6: ABL. (2) Shoot the gray scale chart and adjust the lens iris so that the white peak level is 0.714 Vp-p. (3) Open the iris by 1 stop further.</p>
				<p>◎ TEST OUT (75 Ω terminated) ① SHUTTER/MENU dial ☆ Minimize window black carrier leakage.</p>	<p>(4) Rotate the SHUTTER/MENU dial to select MENU 5/6: FLARE . (5) Push the SHUTTER/MENU dial so that the adjustment value blinks then rotate it to adjust to the specified level. (6) Push the SHUTTER/MENU dial to store the adjustment data in memory.</p>
				<p>◎ TEST OUT (75 Ω terminated) ① SHUTTER/MENU dial ☆ Minimize window black carrier leakage.</p>	<p>(7) Rotate the SHUTTER/MENU dial to select MENU 5/6: FLARE <R>. (8) Push the SHUTTER/MENU dial so that the adjustment value blinks then rotate it to adjust to the specified level. (9) Push the SHUTTER/MENU dial to store the adjustment data in memory.</p>
				<p>◎ TEST OUT (75 Ω terminated) ① SHUTTER/MENU dial ☆ Minimize window black carrier leakage.</p>	<p>(10) Minimize the black carrier leak signal of the gray scale window by repeating the steps (4) to (9).</p>
				<p>◎ TEST OUT (75 Ω terminated) ① Lens iris ☆ 0.714 Vp-p (100 IRE)</p> <p>NTSC 0.714 Vp-p PAL 0.7 Vp-p</p>	<p>(11) Adjust the lens iris to return the white peak of the gray scale to 0.714 Vp-p(NTSC) 0.7 Vp-p(PAL). (12) Ensure that the level of the black section of the window is no more than 30 mVp-p.</p>

No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (†) Adjustment level (☆)	Adjustment procedure								
2	ABL adjustment	<ul style="list-style-type: none"> • Oscilloscope (H-rate, 10:1) or WFM • Gray scale chart (precise scanned size) <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <pre>-CAMERA ADJUST MENU-5 / 6 FLARE B : O FLARE R : O >ABL ADJUST : O DSP data <B ch> <G ch> <R ch> 32 32 32</pre> </div>	Adjustment menu 5/6	◎ TEST OUT (75 Ω terminated) † SHUTTER/MENU dial ☆ Gray scale chart window black level: <table border="1" style="margin-left: 20px;"> <tr><td>NTSC</td><td>110 +5/-0 mVp-p</td></tr> <tr><td>PAL</td><td>55 +5/-0 mVp-p</td></tr> </table>	NTSC	110 +5/-0 mVp-p	PAL	55 +5/-0 mVp-p	<p>(1) Rotate the SHUTTER/MENU dial to select MENU 5/6: ABL.</p> <p>(2) Push the SHUTTER/MENU dial so that the adjustment value blinks then rotate it to adjust to the specified level.</p> <p>(3) Push the SHUTTER/MENU dial to store the adjustment data in memory.</p>  <table border="1" style="margin-left: 20px;"> <tr><td>NTSC</td><td>0.714 Vp-p</td></tr> <tr><td>PAL</td><td>0.7 Vp-p</td></tr> </table>	NTSC	0.714 Vp-p	PAL	0.7 Vp-p
NTSC	110 +5/-0 mVp-p												
PAL	55 +5/-0 mVp-p												
NTSC	0.714 Vp-p												
PAL	0.7 Vp-p												

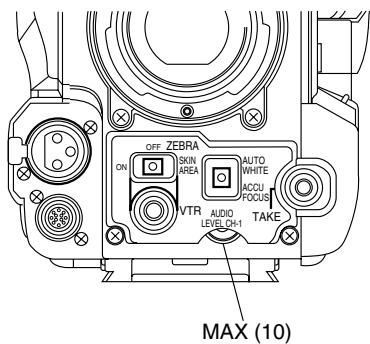
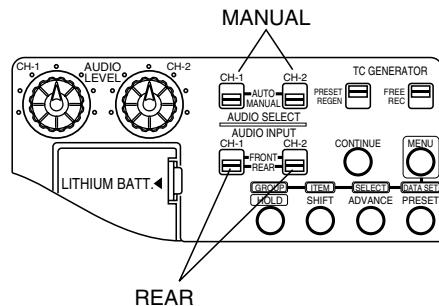
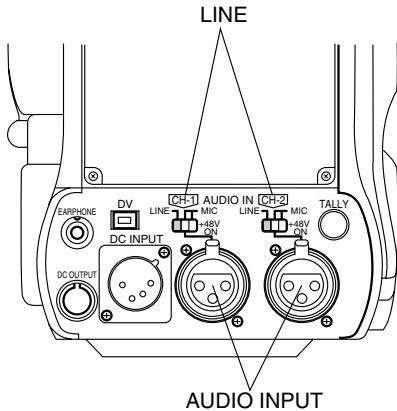
3.5.6 Iris Level Adjustment

1	IRIS LEVEL adjustment	<ul style="list-style-type: none"> • Oscilloscope (H-rate, 10:1) or WFM • Monitor TV • Gray scale chart (precise scanned size) <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <pre>-CAMERA ADJUST MENU-6 / 6 >IRIS LEVEL : O</pre> </div>	Adjustment menu 6/6	◎ TEST OUT (75 Ω terminated) † SHUTTER/MENU dial ☆ NTSC 0.714 ± 0.03 Vp-p PAL 0.7 ± 0.03 Vp-p	<p>(1) Rotate the SHUTTER/MENU dial to select MENU 6/6: IRIS LEVEL.</p> <p>(2) Push the SHUTTER/MENU dial so that the adjustment value blinks then rotate it to adjust to the specified level.</p> <p>(3) Push the SHUTTER/MENU dial to store the adjustment data in memory.</p> 
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3.6 VCR ADJUSTMENTS

3.6.1 Audio Circuitry Adjustments

Before adjustments, set the audio switches, menu and potentiometer as follows.

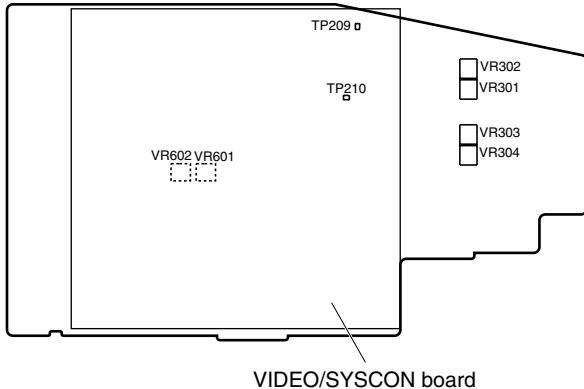


ITEM MENU AUDIO

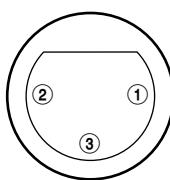
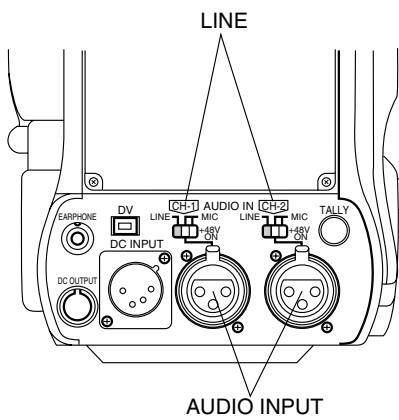
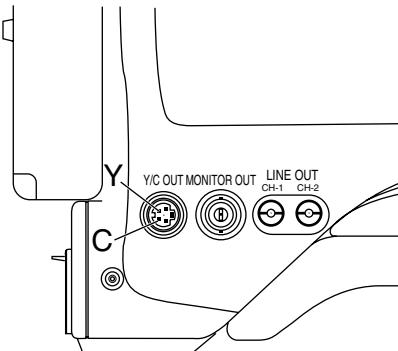
```
244 : LOW CUT      OFF
245 : SAMPLE RATE  48K
246 : FRONT VOLUME ENABLE
                    DISABLE
```

* Refer to page 67 of the instruction book.

- Potentiometer and measuring points for adjustments



AUDIO/LCD board



No.	SIGNAL
①	GND
②	HOT
③	COLD

AUDIO IN connector

No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (①) Adjustment level (☆)	Adjustment procedure
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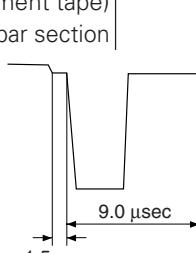
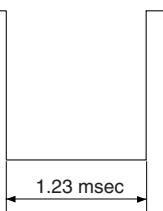
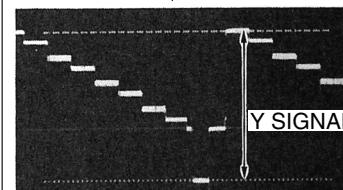
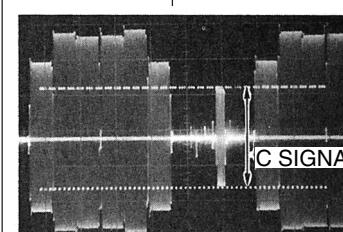
3.6.2 Audio Circuitry Adjustments

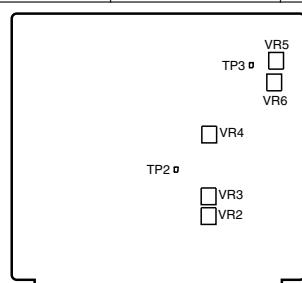
Note : Before proceeding to section "3.5.2 Audio Circuitry Adjustments", complete "3.6.10 Audio Circuitry Adjustment of DV Unit".

1	Preparation				<p>Before adjustments, set the audio switches, menu and potentiometer as follows:</p> <p>[Switches]</p> <p>AUDIO IN : LINE AUDIO INPUT : REAR AUDIO SELECT : MANU</p> <p>[Menu]</p> <p>LOW CUT : OFF SAMPLING RATE : 48KHz FRONT VOLUME ENABLE : DISABLE</p> <p>[Potentiometer(Front panel)]</p> <p>AUDIO LEVEL CH1 : MAX (10)</p>
2	INPUT LEVEL adjustment	• 1kHz,+4dBs • Audio tester	EE	◎ TP209 (CH1) [AUDIO LCD] ① VR201 (CH1) [AUDIO LCD] ◎ TP210 (CH2) [AUDIO LCD] ① VR202 (CH2) [AUDIO LCD] ☆ -22 dBs	(1) Apply a +4 dBs signal to the AUDIO INPUT connector of REAR and adjust the adjustment points so that the levels at the measuring points are as specified.
3	OUTPUT LEVEL adjustment	• 1kHz,+4dBs • Audio tester	EE	◎ LINE OUT ① VR302 (CH1) [AUDIO LCD] ① VR303 (CH2) [AUDIO LCD] ☆ -6 dBs	(1) Perform this adjustment after completing 2 above. (2) Apply a +4 dBs signal to the AUDIO INPUT connector of REAR and adjust the adjustment points so that the levels at the measuring points are as specified.
4	Record/play level adjustment	• 1kHz,+4dBs • Audio tester	Self-recording/ playback	◎ LINE OUT ① VR301 (CH1) [AUDIO LCD] ① VR304 (CH2) [AUDIO LCD] ☆ -6 dBs	(1) Perform this adjustment after completing 2 and 3 above. (2) Apply a +4 dBs signal to the AUDIO INPUT connector of REAR and record the audio onto tape. (3) Play the tape recorded in (2) and adjust the adjustment points so that the levels at the measuring points are as specified.
5	Level meter adjustment	• 1kHz,+4dBs	EE	◎ LCD ① VR601 (CH1) [AUDIO LCD] ① VR602 (CH2) [AUDIO LCD] ☆ LCD's audio level meter display: "-20"	(1) Perform this adjustment after completing 2,3 and 4 above. (2) Apply a +4 dBs signal to the AUDIO INPUT connector of REAR and adjust the adjustment points so that the audio level meter of LCD indicates "-20" for both channels.

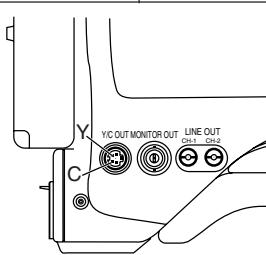
No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (①) Adjustment level (☆)	Adjustment procedure
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3.6.3 Video Circuitry Adjustments

1	SETUP PULSE adjustment	<ul style="list-style-type: none"> Oscilloscope (V-rate, 10:1) MC-1:NTSC MC-2:PAL (alignment tape) color bar section 	PB SETUP: ON (MENU) 	◎ TP3[VIDEO/SYSCON] ① VR2[VIDEO/SYSCON] ☆ 9.0 ± 0.1 μs ◎ VR3[VIDEO/SYSCON] ☆ 1.5 ± 0.1 μs	(1) Play the color bar section of alignment tape MC-1 / MC-2. (2) Adjust the adjustment point so that the initial duration of the SETUP pulse (see diagram on the left) is as specified. (3) Adjust the adjustment point so that the negative-going duration of the SETUP pulse is as specified.
2	DELETE PULSE adjustment (NTSC only)	<ul style="list-style-type: none"> Oscilloscope (V-rate, 10:1) MC-1 (alignment tape) color bar section 	PB SETUP: ON (MENU) 	◎ TP2[VIDEO/SYSCON] ① VR4[VIDEO/SYSCON] ☆ 1.23 ms	(1) Play the color bar section of alignment tape MC-1. (2) Adjust the adjustment point so that the pulse duration at the measuring point is as specified.
3	Y LEVEL adjustment	<ul style="list-style-type: none"> Oscilloscope (H-rate) 	Color bar EE Color bar EE	◎ Y signal output (75Ω terminated) ① VR6[VIDEO/SYSCON] ☆ 1.0 Vp-p ◎ Y signal output (75Ω terminated) ① Adjustment software ☆ 1.0 Vp-p	(1) Set the camera to the color bar mode. (2) With the VCR set to EE, adjust the adjustment point so that the Y signal level in Y/C OUT is as specified. (3) Adjust the Y signal level to the specified level using the adjustment software (see section 3.7.9-1).
4	C LEVEL adjustment	<ul style="list-style-type: none"> Oscilloscope (H-rate) 	Color bar EE Color bar EE	◎ C signal output(75Ω terminated) ① VR5[VIDEO/SYSCON] ☆ NTSC 0.286 Vp-p PAL 0.3 Vp-p burst level ◎ C signal output (75Ω terminated) ① Adjustment software ☆ NTSC 0.286 Vp-p PAL 0.3 Vp-p burst level	(1) Set the camera to the color bar mode. (2) With the VCR set to EE, adjust the adjustment point so that the C signal level in Y/C OUT is as specified. (3) Adjust the C signal level to the specified level using the adjustment software (see section 3.7.9-2).



VIDEO/SYSCON board



Y/C output

3.7 DV ADJUSTMENTS (USING ADJUSTMENT SOFTWARE)

3.7.1 Precautions

- (1) The adjustments of the DV circuit (VTR Unit) of this model require a PC. These adjustments are necessary after replacement of the following parts.
 - EEPROM (IC103 on DV Main board)
 - Mechanism parts
- (2) In case of a problem with the electrical circuit, be sure to identify the point of the trouble first by using measuring instruments. Do not proceed to repair, replacement or adjustment unless the location of the trouble has been identified.
- (3) When observing a TP on a chip, avoid applying stress by using an IC clip, etc. In order to prevent the pattern from being peeled off when replacing a chip part, particularly in the case of an IC, remove the solder completely before removing the part.
- (4) The connectors tend to be broken easily. Be careful when unplugging or plugging a wire.
- (5) Before starting any adjustments, be sure to save the EEPROM data in a PC file for use as backup data in case of an adjustment failure (see section 3.7.12).
- (6) When the adjustment software is run, a tape can be recorded even if its REC SAVE tab is set to "SAVE". Be careful not to record anything onto an alignment tape by mistake.
- (7) When the adjustment software is run, the operations performed on the main unit do not cause the VCR Unit to function accordingly.
- (8) When loading a tape into the GY-DV500, at the same time the power is turned on while the tape is loaded, the unit automatically enters the REC PAUSE mode. To cancel the REC PAUSE mode, press the STOP buttons both of the main unit and of the adjustment software.
- (9) When the adjustment software is run, set the Menu switch "VIDEO 126 :INPUT SELECT" to "IEEE1394". (Only U-ver.)

3.7.2 Equipment Required for Adjustments

- ① PC (Windows machine. Recommended CPU: Pentium 133 MHz or more)
- ② Color TV monitor
- ③ Oscilloscope (2-trace, 100 MHz or more)
 - * 300 MHz or more recommended.
- ④ Digital voltmeter
- ⑤ Frequency counter (with threshold level adjustment)
- ⑥ Tape for use in recording/playback (JVC ME60)
- ⑦ Cleaning tape

3.7.3 Setup for PC Adjustment

Note: This switch is not used with the adjustments of the GY-DV500.

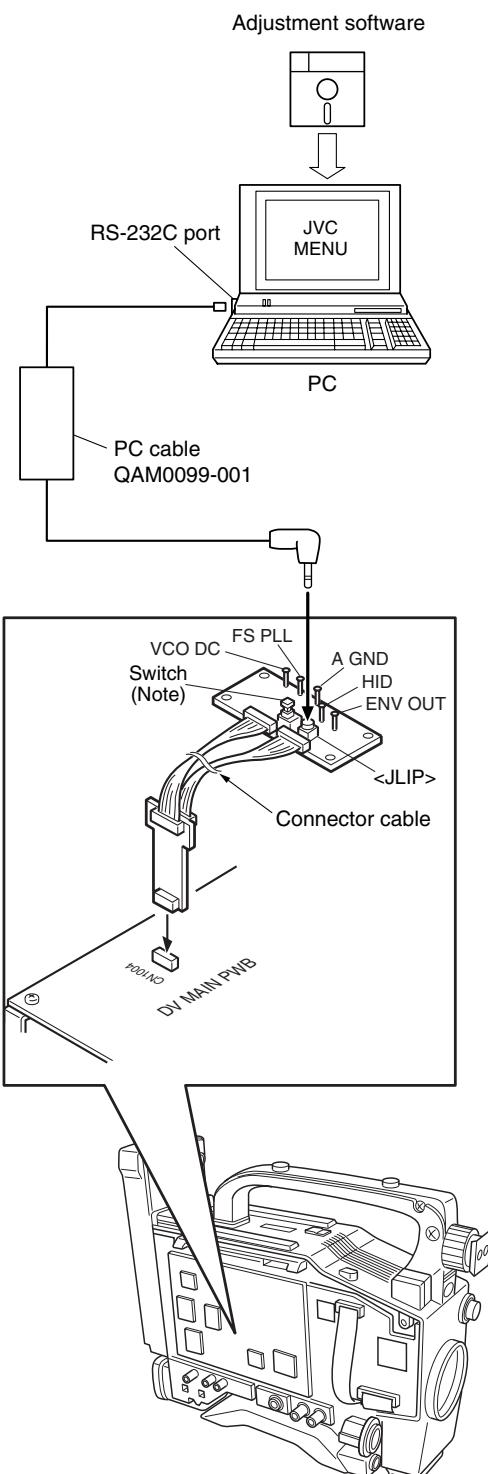


Fig. 3-7-1 Setup for PC Adjustment

3.7.4 Installing the Adjustment Software

Insert the floppy disk of the adjustment software and run "Setup.exe". "Professional DV Adjustment" will be created in "Program" under the Start menu.

3.7.5 Operating the Adjustment Software

1. Startup

Execute "Professional DV Adjustment". When the following screen appears, click <OK> because the adjustment software automatically reads the EEPROM data at the start.

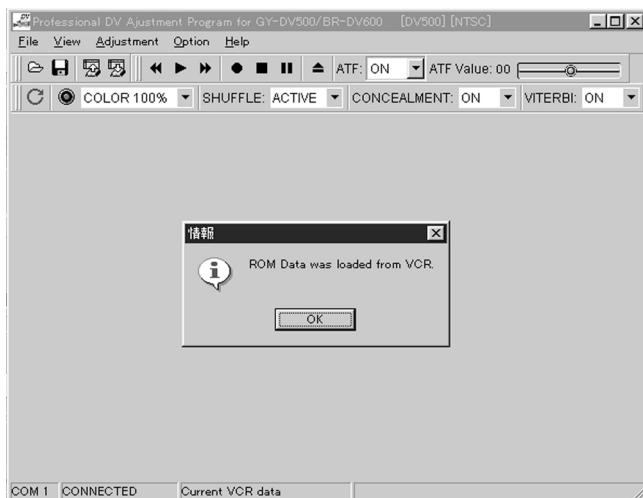


Fig. 3-7-2

The following screen appears when [System Option...] under the [Option] tab is clicked, or the first time that the software is started up. Select the "TV System" and "Model" and click <OK>. This setting is also operative during the next startup. (With the domestic models, select "NTSC" (or "PAL" and "GY-DV500").

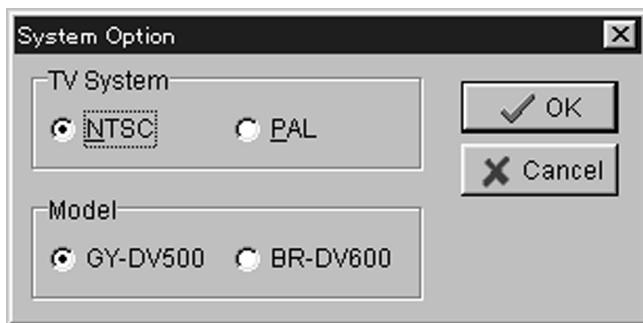


Fig. 3-7-3

If the set "TV System" differs from the setting in the adjustment software, the following warning message appears. Set "TV System" correctly. If the IEEE 1394 ID is not set, the message appears too. Set the ID correctly. (See 3.6.13)



Fig. 3-7-4

2. Function description

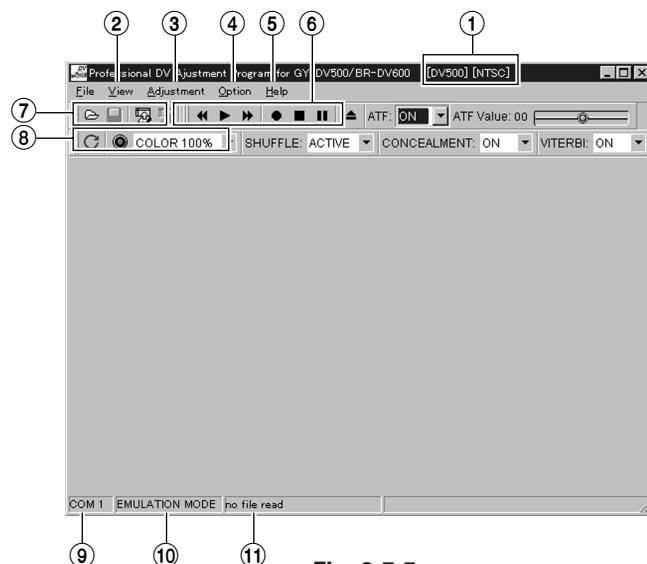


Fig. 3-7-5

① TV System and Model window

Shows the TV system and model selected for the software in [System Option...].

② [View] tab

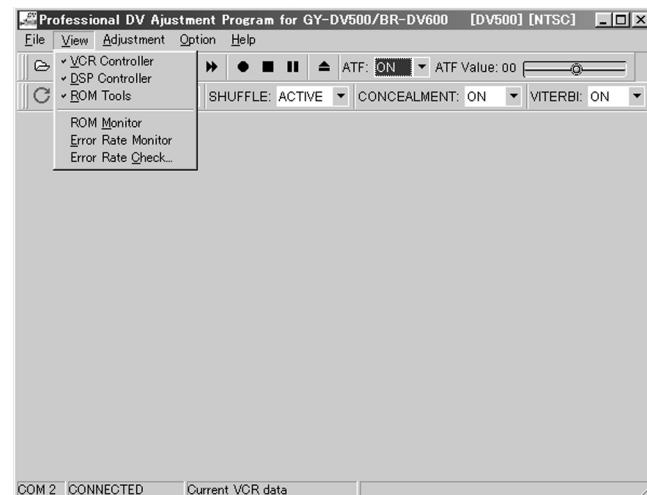


Fig. 3-7-6

- VCR Controller " ⑥ "
- DSP Controller " ⑧ "
- ROM Tools " ⑦ "
- ROM Monitor
- Error Rate Monitor
- Error Rate Check

Switch each item ON or OFF.

The details will be described later.

③ [Adjustment] tab

- Adjustment Explorer (Adjustment menu)
- Active Head Cleaner Adjustment
Forced operation mode for use in adjusting the position of the active head cleaner installation. (See 3.7.14.)

Switch each item ON or OFF.



Fig. 3-7-7

④ [Option] tab



Fig. 3-7-8

• COM Port selection

From COM1 to COM4, select the COM port to which the communication cable is connected.

• System Option...

Select the TV signal format and the model of the connected VCR.

• IEEE1394 ID Setting

ID setting utility of the IEEE1394 standard. (See 3.7.13.)

• Emulation Mode ON/OFF

The emulation mode makes it possible to use the adjustment software even when communication with the VCR is not available. As the following window is displayed in case of a communication error, check "Enter the Emulation Mode".

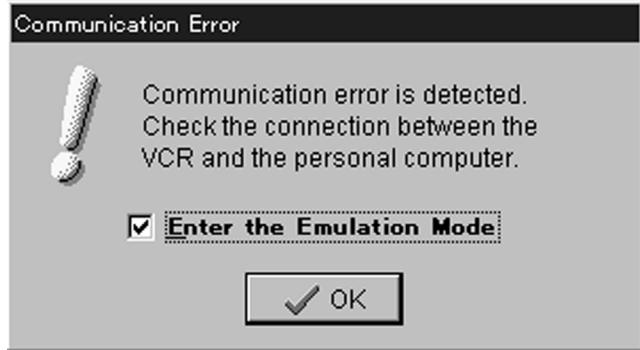


Fig. 3-7-9

⑤ [Help] tab

Displays the version information of the adjustment software.

⑥ **VCR Controller**

Controls the VCR operations.

⑦ **ROM Tools**

Used to check, save, print, modify the memory in the EEPROM (IC103 on DV Main board) or to initialize it. (See 3.7.12.)

⑧ **DSP Controller**

Used to control the TV signal generator in the VTR Unit, switch SHUFFLE, CONCEALMENT and VITERBI ON/OFF. Clicking "C" resets them to the defaults.

⑨ **COM port display**

Shows the COM port in use.

⑩ **Communication status display**

Shows one of the following messages according to the communication status.

CONNECTED: Normal communication

UNKNOWN: Communication error

EMULATION MODE: In emulation mode

⑪ **ROM file display**

Shows the file name or "Current VCR data" while a ROM tool reads EEPROM data. Clicking [ROM Monitor] under the

② [View] tab displays the data contents.

3.7.6 Common Operations for Adjustments

Note: Before adjustment, be sure to save the EEPROM data in a PC file as the backup for use in case of adjustment failure. (See 3.6.12.)

(1) Under the [Adjustment] tab, check [Adjustment Explorer].

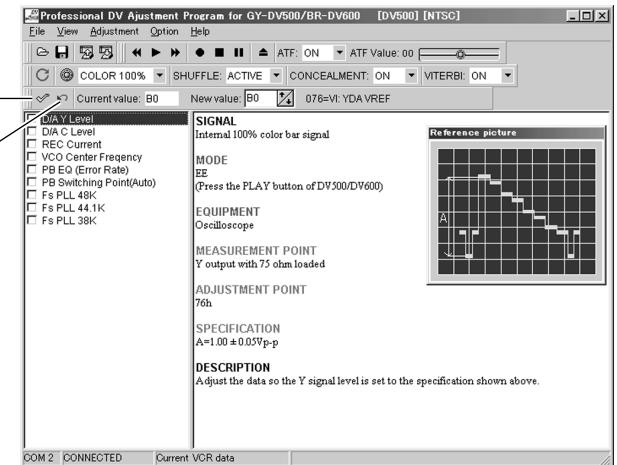


Fig. 3-7-10

(2) Click the desired adjustment items.

(3) To monitor the video output from the VCR Unit, press the PLAY button of the operation switches of the main unit. If the color bar signal has been recorded in the VCR Unit, the playback screen becomes as shown below, but this is not a malfunction (BR-DV600).



Fig. 3-7-11

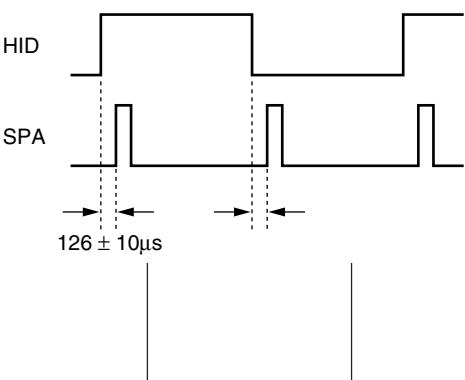
(4) After completing each adjustment item, click the "v" marking, then switch the set OFF.

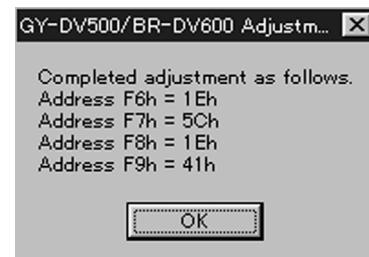
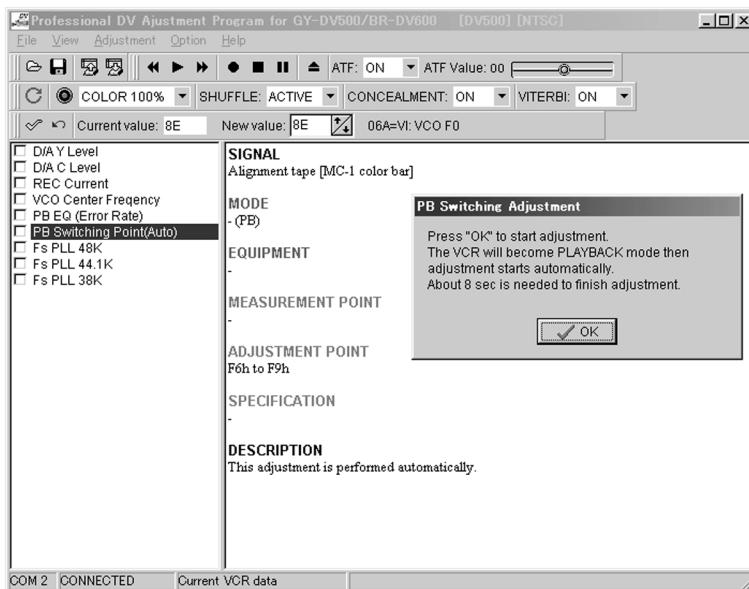
(5) To cancel the adjustment, click the "G" marking.

Note: If another adjustment is started without clicking the "v" marking, the previous adjustment cannot be stored in memory.

No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (①) Adjustment level (☆)	Adjustment procedure
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3.7.7 Servo Circuit Adjustment

1	PB switching point adjustment	• Alignment tape MC-1, color bar	PB	<p>Automatic adjustment</p> <p>★ Adjustment is performed automatically so that the timings of HID and SPA signals are as shown below.</p> 	<p>(1) Click [PB Switching Point (Auto)].</p> <p>(2) Click [OK] to start automatic adjustment.</p> <p>(3) Message "Complete" is displayed when the adjustment has completed successfully. If it is unsuccessful, the message "Adjustment failed" is displayed; try adjustment again.</p>
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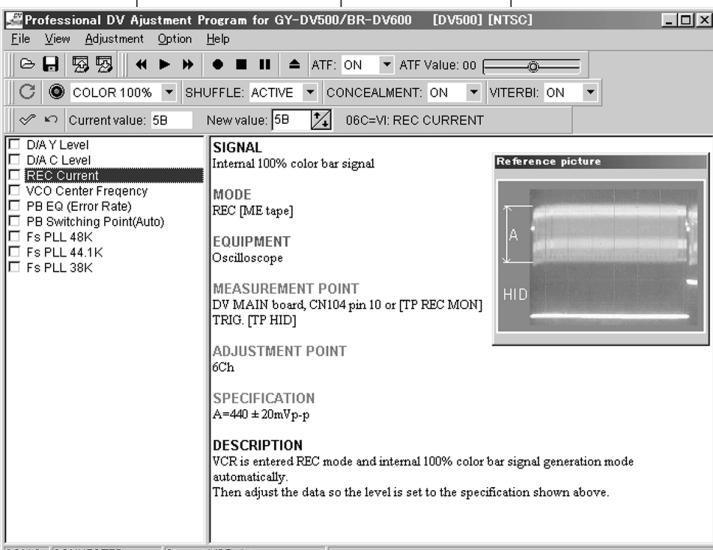
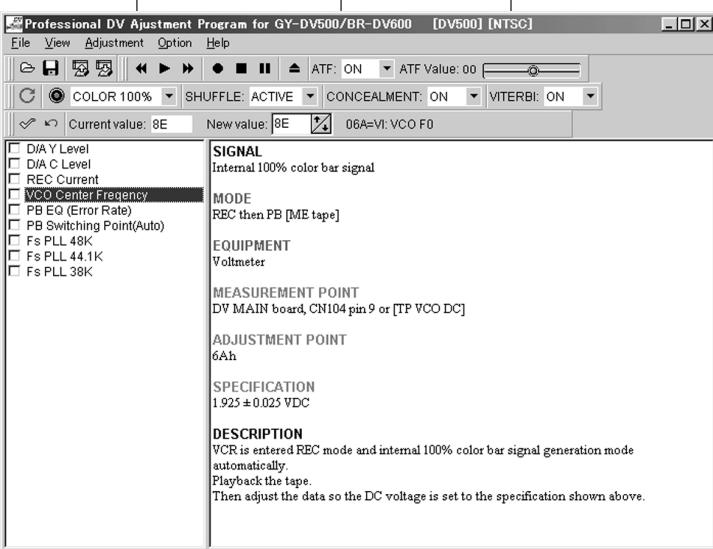
"Complete" message

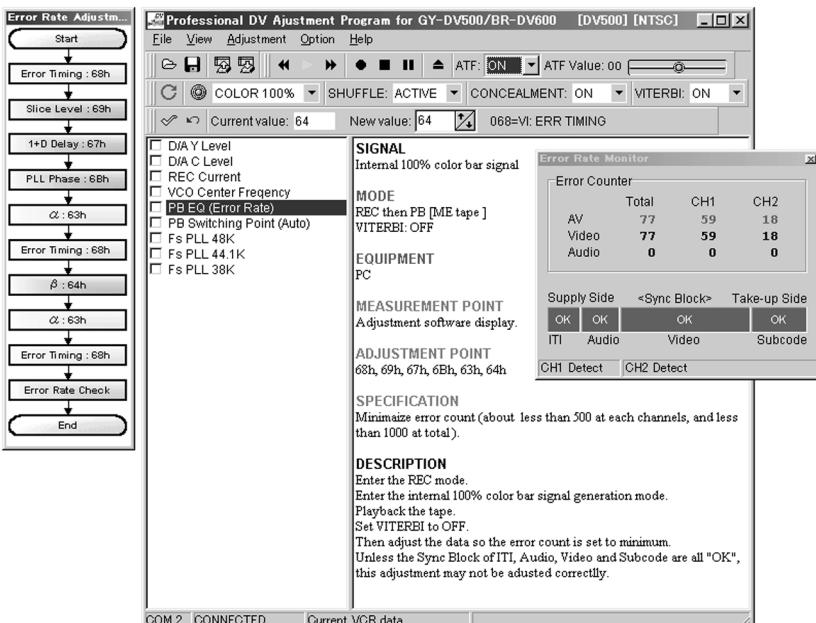


"failed" message

No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (↑) Adjustment level (☆)	Adjustment procedure
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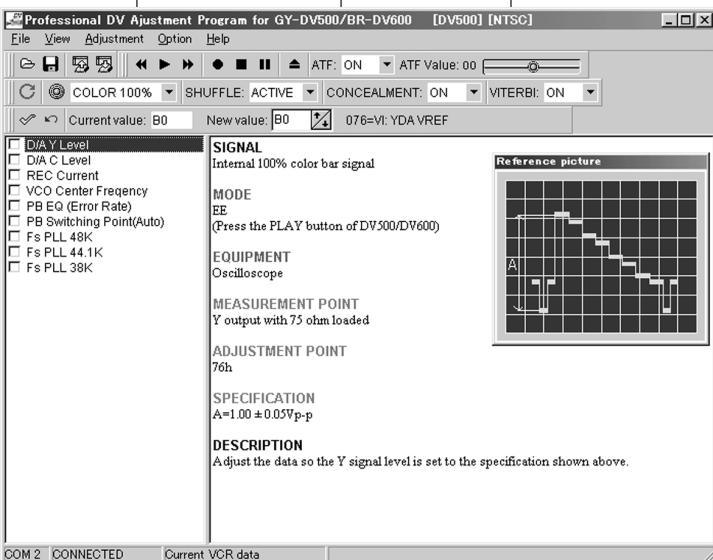
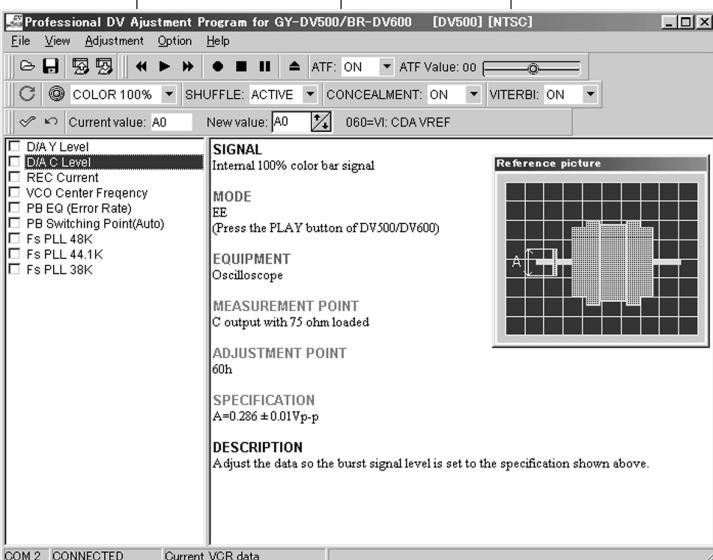
3.7.8 RF Circuit Adjustment

1	REC current adjustment	<ul style="list-style-type: none"> Internal Color bars (100%) Oscilloscope 	REC	<ul style="list-style-type: none"> TP REC MON (connector cable) 6Ch 440 ± 20 mVp-p 	<p>Note: Connect TP to the section indicated [REC MON] on the jig connector in advance.</p> <p>(1) Click [REC Current]. (2) Click the [OK] button. (3) Adjust "New value" (address "6Ch") so that the level becomes the adjustment level. (4) After adjustment, click the "v" marking and set the power button of the set to OFF.</p> 
2	VCO center frequency adjustment	<ul style="list-style-type: none"> Internal Color bars (100%) Digital voltmeter 	REC ↓ PB	<ul style="list-style-type: none"> TP VCO DC (connector cable) 6Ah 1.925 ± 0.025 V 	<p>(1) Click [VCO Center Frequency]. (2) Click the [OK] button. (3) Play the tape section containing color bars. (4) Adjust "New value" (address "6Ah") so that the level becomes the adjustment level. (5) After adjustment, click the "v" marking and set the power button of the set to OFF.</p> 

No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (①) Adjustment level (☆)	Adjustment procedure
3	PB EQ (Error rate) adjustment	<ul style="list-style-type: none"> Internal color bars (100%) PC <pre> Start ↓ Error Timing : 68h ↓ Slice Level : 69h ↓ 1 + D Delay : 67h ↓ PLL Phase : 6Bh ↓ α : 63h ↓ Error Timing : 68h ↓ β : 64h ↓ α : 63h ↓ Error Timing : 68h ↓ Error Rate Check ↓ End </pre> <pre> START ↓ 2.4.3 Head cleaning ↓ Is error rate within specification? OK → END NG → 2.4.3 Head cleaning ↓ Is error rate within specification? OK → END NG → Replace tape. ↓ Is error rate within specification? OK → END NG → 2.12 Interchangeability Adjustment ↓ Is error rate within specification? OK → END NG → Drum failer or RF circuit failer ↓ To START </pre>	<ul style="list-style-type: none"> • REC ↓ PB • VITERBI : OFF 	<ul style="list-style-type: none"> ◎ PC monitor ① 68h, 69h, 67h, 6Bh, 63h, 64h ☆ Minimize error rate (Total less than 1000, and less than 500 at each channels) 	<p>Notes:</p> <ul style="list-style-type: none"> • Use a new tape or non-used section of tape in this adjustment. • Be sure to clean the head before this adjustment. • It takes about 1 second from the data change to its reflection in the error rate. • Also measure the error rate after the "Sync Block" monitor has become perfectly OK. • If the adjustment within specification is not possible, clean the head. If the next adjustment is still out of specification, use another tape. <p>(1) Click [PB EQ (Error rate)]. (2) Click the [OK] button. (3) Adjust "New value" of each address to minimize the error rate, by following the order shown in the flow chart. (4) After adjustment, click the "v" marking and set the power button of the set to OFF.</p> 

No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (①) Adjustment level (☆)	Adjustment procedure
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3.7.9 Video Circuit Adjustments

1	D/A Y level adjustment	<ul style="list-style-type: none"> Internal color bars (100%) Oscilloscope 	EE (With PLAY lit on the set)	◎ Y OUT (75 Ω terminated) ① 76h ☆ 1.00 ± 0.05 Vp-p	<ol style="list-style-type: none"> Click [D/A Y Level]. Click the [OK] button. Press the "PLAY" button of the set and check that the LED lights up. Adjust "New value" (address "76h") so that the Y level becomes the adjustment level. After adjustment, click the "v" marking and set the power button of the set to OFF. 				
2	D/A C level adjustment	<ul style="list-style-type: none"> Internal color bars (100%) Oscilloscope 	EE (With PLAY lit on the set)	◎ C OUT (75 Ω terminated) ① 60h ☆ <table border="1"> <tr> <td>NTSC</td> <td>0.286 ± 0.01 Vp-p</td> </tr> <tr> <td>PAL</td> <td>0.30 ± 0.01 Vp-p</td> </tr> </table> (Burst)	NTSC	0.286 ± 0.01 Vp-p	PAL	0.30 ± 0.01 Vp-p	<ol style="list-style-type: none"> Click [D/A C Level]. Click the [OK] button. Press the "PLAY" operation button of the set and check that the LED lights up. Adjust "New value" (address "60h") so that the burst level becomes the adjustment level. After adjustment, click the "v" marking and set the power button of the set to OFF. 
NTSC	0.286 ± 0.01 Vp-p								
PAL	0.30 ± 0.01 Vp-p								

No.	Item	Measuring instruments & Input signals	Mode	Measuring point (◎) Adjustment parts (①) Adjustment level (☆)	Adjustment procedure
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3.7.10 Audio Circuit Adjustment

(Note)

- Perform the audio circuitry adjustments immediately after turning the main unit ON. Be sure to turn the main unit OFF after completing each adjustment item.

1	Fs PLL (48k) adjustment	<ul style="list-style-type: none"> • No signal • Frequency counter 	EE	◎ TP FS PLL (connector cable) ① 62h ☆ 12.288 ± 0.020 MHz	(1) Click [Fs PLL (48k)]. (2) Click the [OK] button. (3) Adjust "New value" (address "62h") so that the frequency level becomes the adjustment level. (4) After adjustment, click the "v" marking and set the power button of the set to OFF.
2	Fs PLL (44.1k) adjustment	<ul style="list-style-type: none"> • No signal • Frequency counter 	EE	◎ TP FS PLL (connector cable) ① FCh ☆ 11.2896 ± 0.110 MHz	(1) Click [Fs PLL (44.1k)]. (2) Click the [OK] button. (3) Adjust "New value" (address "FCh") so that the frequency level becomes the adjustment level. (4) After adjustment, click the "v" marking and set the power button of the set to OFF.
3	Fs PLL (38k) adjustment	<ul style="list-style-type: none"> • No signal • Frequency counter 	EE	◎ TP FS PLL (connector cable) ① FDh ☆ 8.192 ± 0.080 MHz	(1) Click [Fs PLL (38k)]. (2) Click the [OK] button. (3) Adjust "New value" (address "FDh") so that the frequency level becomes the adjustment level. (4) After adjustment, click the "v" marking and set the power button of the set to OFF.

3.7.11 Error Rate Monitoring

The error rate-monitoring screen is displayed when the PB EQ is adjusted or the error rate is measured. The screen shows the error rate every second during PB EQ adjustment. With the error rate measurement, it shows the error rate measurement result after about 20 seconds of measurement.

(1) Error Rate Monitoring

The following screen appears when [View] under the [Error Rate Monitor] tab is clicked.

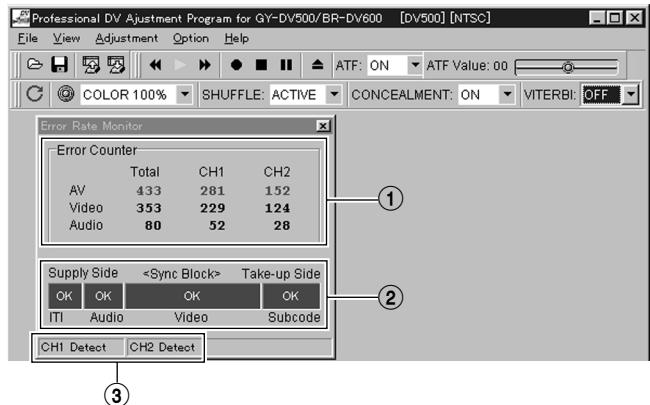


Fig. 3-7-12 (Error Rate Monitoring Screen)

(1) Error rate display window

Shows the error rate per video/audio or CH-1/CH-2 as well as the total error rate.

(2) Sync block counter display window

Shows the amount of sync blocks played by the head as a percentage. When it reaches 100%, "OK" is displayed and a graph is displayed blue. The error rates are measured when this display shows "OK".

(3) Error rate measurement status display window

Depending on the load to the PC, "CH1 Reset" or "CH2 Reset" may be displayed frequently. In such a case, leave the PC idle (without operating the mouse, etc.). The error rates are measured when "Reset" is not displayed (when "CH1 Detect" or "CH2 Detect" is displayed).

(2) Error Rate Measurement

The following screen appears when [View] under the [Error Rate Check] tab is clicked. To start the measurement, click [Start] button. After a while the measurement result is displayed "①".

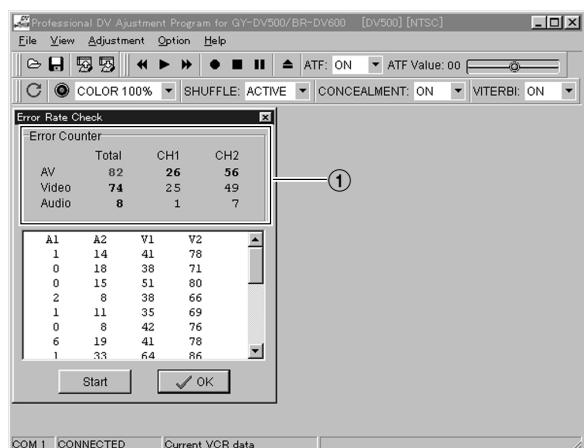


Fig. 3-7-13 (Error Rate Measurement)

3.7.12 ROM Tools

This section describes the seven functions of the ROM Tools in processing the EEPROM data.

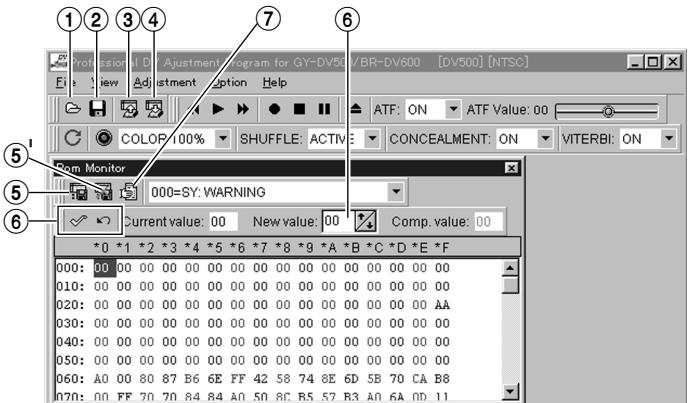


Fig. 3-7-14

(1) File reading

Read the ROM data saved in the PC files. It is provided as standard with the adjustment software, for use as initial data. When the PC files are read, the file names are displayed in the ROM file display window.

(2) File saving

The ROM data read by the ROM Tools can be saved in a PC file. This function is used for temporary backup of ROM data before adjustment. If the adjustment fails and the data becomes erroneous, use the backup to restore the original data.

(3) Data read from VCR

The ROM data in the VCR can be read. The ROM file display window shows "Current VCR data" in this case.

(4) Data write in VCR

The ROM data read by the ROM Tools can be written in the VCR. When the initial data is written, it is required to re-adjust the DV circuit and re-set the IEEE1394 ID (see 3.7.13).

(5) Data comparison

Note: When the ROM data is written in the VCR, be sure to turn the main unit and adjustment software OFF once.

The ROM data read by the ROM Tools is compared with data contained in a PC file or with the VCR data, and any differences are displayed in red characters. "Comp. value" shows the data used in the comparison. It shows "(" when the comparison data does not exist. To cancel comparison, click ⑤'.

(6) Data editing

The ROM data read by the ROM Tools can be edited on a per-address basis. To edit data, click the [New value] of the required address data. To write the data in the VCR, click the "V" marking. To cancel editing, click the "C" marking.

(7) Data output

The ROM data read by the ROM Tools can be output at a printer or as a text file.

3.7.13 IEEE1394 ID Setting

The GY-DV500 stores the ID in the format specified by the IEEE1394 standard in the EEPROM (IIC103 on DV Main board). After replacing the EEPROM or the DV Main board, it is required to re-set the ID. The setting is possible with either of the methods outlined below.

1. Setting by manual input

- (1) Under the [Option] tab of the adjustment software, click the [IEEE1394 ID Setting]. The window as shown below appears.

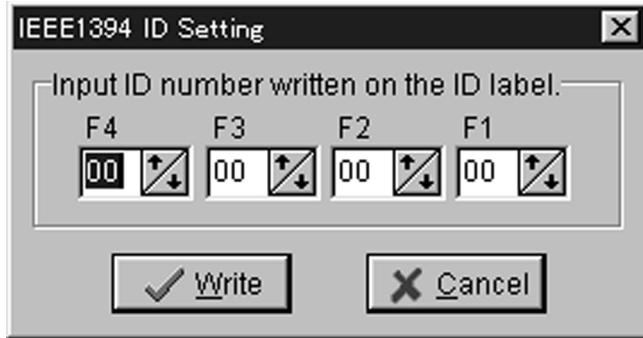


Fig. 3-7-15

- (2) The ID ("ID : 0401xxxx" : NTSC, "ID : 0481xxxx" : PAL) is indicated on the ID label number attached to the DV Main board. Input characters corresponding to "0401xxxx" for NTSC or "0481xxxx" for PAL.
- (3) Click "Write" to write the ID in the EEPROM.

2. Setting with ROM Tools

- (1) Read the data saved in the EEPROM to be replaced. (See 3.7.12.③.)
- (2) Save the read data in a PC file. (See 3.7.12.②.)
- (3) After the EEPROM replacement, connect the adjustment software to the GY-DV500.
- (4) Load the data saved in the PC file. (See 3.7.12.①.)
- (5) Write the loaded data in the EEPROM. (See 3.7.12.④.)
- (6) Now that the adjustment data in the new EEPROM has been overwritten by the data in the previous EEPROM. Re-adjust the DV circuit as required.

3.7.14 Active Head Cleaner Adjustment Mode

When adjusting the installation position of the active head cleaner, use this mode to force the active head cleaner ON for a certain period. (See subsection 2.7 No. 20 for the adjustment procedure.)

- (1) Under the [Adjustment] tab, click [Active Head Cleaner Adjusting...]. The window as shown below appears.

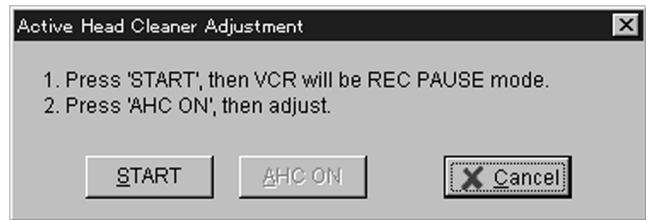


Fig. 3-7-16

- (2) Click [START] to set to "REC PAUSE" mode.
- (3) Click [AHC ON]. The active head cleaner will turn on in about 3 seconds.
- (4) Adjust the installation position as described in the adjustment procedure.

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